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Templeman HFRA
Healthy Forests Restoration Act Project
Environmental Assessment

Bonners Ferry Ranger District
Idaho Panhandle National Forests
Boundary County, Idaho

Unit 5 (proposed) Templeman HFRA EA Project (2006 photo)
Fuel Model 10 (timber with heavy surface fuels)

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Idaho Panhandle National Forests
Bonners Ferry Ranger District
Boundary County, Idaho

Templeman HFRA Project

Environmental Assessment

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SUMMARY

The Templeman Healthy Forests Restoration Act (HFRA) project proposes fuels reduction treatments on National Forest System lands in the Meadow Creek and Kootenai River watersheds of the Bonners Ferry Ranger District. The objectives of the project are to 1) reduce hazardous fuels within the Boundary County Community Wildfire Protection Plan (CWPP)-defined wildland urban interface (WUI) area and; 2) trend towards or maintain vegetative conditions that would be resilient to fire in the Meadow Creek and Kootenai River watershed.

Alternative 2, the proposed action and preferred alternative, would remove approximately 40 to 60 tons per acre of forest fuels, changing the fire behavior characterization from a Fuel Model 10 (timber with heavy surface fuels) to a Fuel Model 8 (timber with light timber litter), across a 1,200-acre treatment area, utilizing forest products including biomass to the fullest extent possible. The proposed action would also accomplish routine road reconstruction such as brushing, blading, ditch reestablishment, ditch relief pipe replacements, hazard tree removal along haul routes, etc. on approximately 10 miles of existing roads and construct about one-half mile of temporary roads that would be decommissioned following use to maintain pre-treatment access levels.

Copies of this Environmental Assessment (EA) are available on compact disc (CD) from the Bonners Ferry Ranger District; and it is posted on the Idaho Panhandle National Forests internet site at www.fs.fed.us/ipnf/eco/manage/nepa/index.html. A limited number of printed copies may also be available.

DOCUMENT STRUCTURE

The Forest Service has prepared this EA in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This EA discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action. Additional documentation,

including more detailed analyses of project-area resources, may be found in the project planning record located at the Bonners Ferry Ranger District office. The document is organized into three chapters, appendices that include resource specialist reports, analysis, other supporting documentation, and various lists, as follow:

- **Chapter 1 - Purpose and Need for Action:** This chapter briefly describes the proposed action, the need for that action, and other purposes to be achieved by the proposal.
- **Chapter 2 - No-Action (Baseline Condition) and Preferred Alternative:** This chapter details how the Forest Service informed the public and used a collaborative process to develop the proposed action and how the public responded. This chapter also provides a detailed description of the agency's proposed action. The end of the chapter includes a summary table comparing the proposed action to the baseline condition with respect to their differences in management activities.
- **Chapter 3 - Affected Environment and Environmental Consequences:** This chapter describes the current conditions (baseline) of the project area related to the resources and what the resulting potential environmental impacts would be by implementation of the proposed action, as compared to the likely effects from continuing with the current baseline conditions.
- **Appendix A: Significant Issue #1 Detailed Soils Analysis,** Including analysis that provides more detailed information to support that presented in the EA.
- **Appendix B: Significant Issue #2 Detailed Analysis of Fire Risk to Life and Property,** Including analysis that provides more detailed information to support that presented in the EA.
- **Appendix C: Other Issues for non-alternative-driving resources,** Including analyses that provide more detailed information to support that presented in the EA.
- **Appendix D: Listing of Past, Ongoing and Reasonably Foreseeable activities for consideration of cumulative effects analysis.**
- **Appendix E: List of Preparers:** This section provides a list of individuals and the interdisciplinary team of resource specialists involved with this project.
- **Appendix F: List of Persons, Organizations and Agencies Consulted:** This section lists the agencies, persons and organizations that were consulted during the development of the EA.

TABLE OF CONTENTS

Summary i

Document Structure i

Chapter 1 – Purpose and Need 5

Section 1.1 Introduction 5

Section 1.2 Background 5

Section 1.3 Purpose and Need 5

Section 1.4 Proposed Action 6

Section 1.5 Decision To Be Made 6

Section 1.6 Project Area Description 6

Section 1.7 Relationship To The Forest Plan 6

Section 1.8 Project Area Desired Future Condition (DFC) 7

Section 1.9 Public Involvement And Collaboration 7

Section 1.10 Significant Issues 9

Section 1.11 Other Issues 9

Section 1.12 Applicable Federal Laws And Executive Orders 10

Chapter 2 - No Action (Baseline Condition) And Preferred Alternatives 12

Section 2.1 Introduction 12

Section 2.2 Process Used To Formulate Action Alternative 12

Section 2.3 Alternative Descriptions 12

2.3.1 Alternative 1 – No Action (Baseline Condition) 12

2.3.2 Alternative 2 – Proposed Action 12

Section 2.4 Design Criteria And Mitigations 15

Section 2.5 Monitoring 19

Section 2.6 Alternative Comparison 19

Chapter 3 Affected Environment And Environmental Consequences 21

Section 3.1 Introduction 21

Section 3.2 Soil Resource (Significant Issue 1) 22

3.2.1 Analysis Area 22

3.2.2 Affected Environment 22

3.2.3 Other Conditions 22

3.2.4 Alternative 1 – No Action 23

3.2.5 Alternative 2 - Proposed Action 25

Section 3.3 Fire - Risk To Life And Property (Significant Issue 2) 29

3.3.1 Analysis Area 29

3.3.2 Affected Environment 29

3.3.3 Fuel Characteristics: fuel loading, canopy characteristics, species composition, structure, continuity, etc. ……..29

3.3.4 Fire History....33

3.3.5 Fire Regime Condition Class....34

3.3.6 Fire Behavior....37

3.3.7 Past, Present, Reasonably Foreseeable Activities....47

3.3.8 Cumulative Effects Related to Fire and Fuels....48

3.3.9 Forest Plan and Other Regulatory Direction Consistency by Alternative....50

Table 1 - Proposed Fuels Reduction Treatments by Unit....14
Table 2 - Alternative Comparison of Project Activities....20
Table 3 - Soil -1: Summary of existing conditions and potential impacts for the Proposed Action following guidelines in Niehoff (2002; PF SOIL-44)....23
Table 4 - SOIL-2. Distribution of harvest treatments for the Proposed Action....25
Table 5 - Coarse Woody Debris>3" diameter material....31
Table 6 - Summary loading of small dead fuels in tons/acre for typical untreated stand in project area....32
Table 7 -Current CBH and CBD in the project area....33
Table 8 - Definitions of Condition Classes....35
Table 9 - FRCC departure by major forest type represented....37
Table 10 - Fire Regime Condition Class departure by forest type within the project area....41
Table 11 - Suppression capabilities based on expected surface flame lengths by forest type and Alternative....42
Table 12 - Summary: probability of torching and crowning index by alternative – a range that includes moist and dry forest types....44
Table 13 - Total smoke emission (PM 10 and PM 2.5) for project related activities by Alternative....46
Table 14 - Summary of emissions during a wildfire by alternative....47

Figure 1 - Proposed Unit Location and Activity Map....13
Figure 2 - Fuels 1 (Dry site on left) and Figure 3 - Fuels 2 (Moist site on right). Examples of fuel model 10 – photos taken in the project area....30
Figure 4 - Current FRCC percent departure from natural range....36
Figure 5 - Templeman Lake Fire Plantation....38
Figure 6 - Example of treated dry-site on district – fuel model 8 after underburning....43
Figure 7 - Example of treated moist-site on district – fuel model 8 after grapple-piling and burning piles....43
Figure 8 - Comparison of the general effectiveness by Alternative on the *Surface Flame Lengths* in the treatment areas....44
Figure 9 - Comparison of the general effectiveness by Alternative on the *Probability of Torching*....45
Figure 10 - Comparison of the general effectiveness of the Alternatives on the *Crowning Index.*....45

Chapter 1 – Purpose And Need

Section 1.1 Introduction

The Forest Service has prepared this Environmental Assessment (EA) on the potential environmental effects that could result from implementing fuels reduction activities in a location approximately eight miles north of Bonners Ferry, Idaho (Figure 1). This EA was completed in compliance with the National Environmental Policy Act (NEPA), the Healthy Forests Restoration Act (HFRA) and other relevant federal and state laws and regulations. This EA discloses the direct, indirect and cumulative environmental impacts that would result from the proposed action. It is prepared according to the format established by Council of Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508).

Planning was coordinated with the appropriate federal, state, and local government entities and agencies, and local federally recognized tribes. Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Bonners Ferry Ranger District Office in Bonners Ferry, Idaho. These records are available for public review.

Section 1.2 Background

In response to the devastating fires of 2000, one of the worst fire seasons within the last 50 years, President Clinton asked Secretaries Babbitt and Glickman to prepare a report and recommend how best to respond to severe wildfires, how best to reduce the impacts of those fires on rural communities, and how to insure sufficient firefighting resources in the future. On September 8, 2000, President Clinton accepted their report Managing Impacts of Wildfires on Communities and the Environment. Based on this report and from increased concerns of the impacts that fires were having, Congress directed Federal land managers to work in partnership with Western Governors on a long term strategy for the proactive restoration of fire-prone ecosystems. Their strategy set four goals that collectively emphasize measures to reduce the risk to communities and the environment from severe wildfire and that establish an effective framework for collaboration. They are:

1) Improve prevention and suppression.
2) Reduce hazardous fuels.
3) Restore fire adapted ecosystems.
4) Promote community assistance.

Section 1.3 Purpose and Need

The proposed Templeman HFRA EA Project is designed under the requirements of HFRA and for the purpose of responding to the 10-year Comprehensive Strategy (http://www.forestsandrangelands.gov/plan/documents/10-YearStrategyFinal_Dec2006.pdf), focusing primarily on reducing hazardous fuels in the wildland urban interface (WUI). Based upon findings from field reconnaissance and information gathering done by Templeman Project Team members who specialize in fire and fuels management, the existing condition within the proposed project area includes fuel loading and arrangement of fuels on the ground and in the tree crowns that make the area susceptible to severe wildfire behavior that can potentially impact this “at-risk” community (Fuels analysis, EA Appendix B). There exists a need to change the current fire Fuel Model 10 to a Fuel Model 8 in order to reduce the intensity of future fires that may occur in this wildland urban interface area. Reducing fire intensity will make it safer and easier for fire fighters to suppress future fires when they occur, thus improving the safety of humans, their homes, associated access roads and utilities in this affected area.

The project proposal concurrently addresses identified hazards and vulnerabilities described in the Boundary County Wildland/Urban Interface Fire Mitigation Plan (CWPP). The County Plan was developed in 2003 (amended February 2004) through a collaborative process between Boundary County citizens, federal, state and local agencies, non-profit organizations, and the private sector. The group formed several goals to begin mitigation of fire risk within the wildland/urban interface. These goals include fuels modification treatments within two miles of homes and associated infrastructure, including roads, in order to protect humans, their habitations and evacuation routes.

The Templeman HFRA project area is surrounded by and shares common boundaries with private residences and associated infrastructures (copy of Boundary County CWPP and WUI map kept at Bonners Ferry district office).

Section 1.4 Proposed Action

The proposed action for the Templeman HFRA Project is to implement treatments to reduce forest fuel accumulations on approximately 1,200 acres of National Forest System Land by using a combination of mechanical treatments, hand treatments and prescribed fire. A contract, possibly under stewardship authorities, would be prepared and trees and other biomass (woody debris) meeting specified conditions would be sold or required to be removed from National Forest lands.

Proposed treatments developed through collaborative meetings include reducing live and dead ladder and down fuels through a combination of:

- Juvenile-tree precommercial hand-chainsaw thinning (i.e. 2 to 6-inch diameter trees, cut trees left on site) on 100 acres.
- Mechanical poletimber biomass thinning (i.e. 2 to 7 inch diameter tree thinning with removal and utilization of thinned biomass, mostly for energy conversion to electricity or ethanol) utilizing small-scale harvesting equipment on 300 acres.
- Commercial thinning, sanitation salvage, group selection and shelterwood harvest treatments (i.e. 7-inch and larger diameter trees suitable for lumber products) on 800 acres. Unit 6 (26 acres) would be revised from a previously proposed seed-tree with reserves prescription to a shelterwood treatment, in order to reserve more large diameter snag recruitment trees, mainly grand-fir and hemlock.
- Prescribed fire treatments on approximately 450 acres following mechanical fuels reduction treatment harvests with the intent to incorporate fire into long-term management plans for continuing frequent (i.e. 5 to 15 year intervals) low-intensity understory brush control maintenance burns within these acres.

The proposed action includes other features such as minor road reconstruction, slash disposal methods and also project operational features that are designed to protect various resources within the project area. Refer to Chapter 2 and the project file for more details.

Section 1.5 Decision To Be Made

Based on the environmental analyses in this EA, the Forest Supervisor will decide whether or not to reduce fuel loading as proposed within the project area in accordance with current Forest Plan goals, objectives and desired future conditions.

Section 1.6 Project Area Description

The project area is located near Templeman Lake, approximately 8 miles north of Bonners Ferry within Sections 12, 13 and 24, Township 63 North, Range 1 East, of the Boise Meridian, on the Bonners Ferry Ranger District of the Idaho Panhandle National Forests, Boundary County, Idaho. The project area encompasses approximately 1,700 acres with treatments proposed on about 1,200 acres (see project Chapter 2, page 13).

Section 1.7 Relationship To The Forest Plan

Activities that are planned in the National Forest System involve two different levels of decisions: a general (programmatic) decision for the entire Forest, and a site-specific decision for the project area.

The programmatic decision is the Forest Plan that provides overall direction for land management activities. The Idaho Panhandle National Forests (IPNF) Plan, implemented in August of 1987, is used to guide land management activities on the Bonners Ferry Ranger District.

The IPNF Plan Final Environmental Impact Statement (FEIS) contains a general cumulative effects analysis of anticipated management activities on a landscape level for resource values such as wildlife populations and water quality of major drainages.

The IPNF Plan also establishes standards that preclude or limit activities to protect the environment. These standards are used to develop mitigation measures for the proposed action (project). They are also used to assess an action's effects to ensure that the project complies with the Forest Plan.

The Inland Native Fish Strategy (INFS 1995) amended the IPNF Forest Plan management area direction in August 1995, and added standards and guidelines to protect water and aquatic biota.

This EA is a site-specific decision level document for planning activities. It is tiered to the Forest Plan FEIS to allow the EA to focus on specific resource management issues in the project area. This EA is not a general management plan for the project area or a programmatic environmental assessment. It is a site-specific linkage between the Forest Plan and the requirements established by NEPA. This decision level involves analyzing site-specific proposals as well as disclosing their environmental effects to achieve the general guidelines of the Forest Plan. This information will be used by the Responsible Official to select a reasonable course of action for managing the project area.

The project was designed in conformance with forest plan standards and incorporates appropriate Forest Plan guidelines for Management Area 1 and 4 (IPNF Forest Plan, pages III-2 to III-6; III-17 to III-22 respectively). The appendices and project file contain analysis reports that verify this determination, including reports on soils, hydrology, wildlife, fisheries, botany, fuels management, visuals and silvicultural prescriptions.

Section 1.8 Project Area Desired Future Condition (DFC)

The desired future condition for the project area includes reduced surface fuels to create a condition that lessens surface fire intensity from what is currently expected, removal of ladder fuels to reduce the ability of fire moving into the tree crowns and increased crown spacing to reduce the ability of fire to spread between crowns should fire reach the crowns. The DFC would thus provide improvement for homeowner and firefighter safety by allowing for direct attack and a higher probability of success during fire suppression actions.

Section 1.9 Public Involvement And Collaboration

This project has transitioned from the analysis and decision process of a categorically excluded project under 36 CFR 215 NEPA procedures to an Environmental Assessment under the Healthy Forests Restoration Act NEPA procedures described in 36 CFR 218.

On January 31, 2007, Boundary County Commissioner Dan Dinning facilitated an initial collaborative meeting for the Templeman and one other possible HFRA project area (Twin Skin). Invited attendees included the presidents of the Bee Line and Skin Creek Water Associations, a representative from the Kootenai Tribe, the mayors of Moyie Springs and Bonners Ferry, the Bonners Ferry City Engineer, the Bonners Ferry USFS District Ranger and two other district personnel.

The purpose of the meeting was to discuss the merits of conducting fuels reduction projects within areas that could affect the Skin Creek and Bee Line Water Associations water supply as well as the cities of Moyie Springs and Bonners Ferry (i.e. power from Moyie Dam). All attendees agreed that there was a need to reduce hazardous fuels within the areas that could adversely affect the community water supplies as well as destroy homes and block evacuation routes if the fuels were ignited. At the close of this meeting, District Ranger Mike Herrin decided to schedule a public open house in order to form collaborative groups that would help develop proposed actions for the two projects.

On March 8, 2007 a public open house was held at the Bonners Ferry Ranger District. Over 100 invitations to attend the meeting were mailed out to adjacent landowners, other individuals, government entities, agencies and organizations. The purpose of this meeting was to build on the previous collaborative meeting and open it up to any and all stakeholders who wanted to be informed about the Templeman and Twin Skin HFRA projects and also to form collaborative groups in order to help develop the proposed actions for the two projects.

Eighteen people attended the meeting. Participants represented the Idaho Department of Lands, the Idaho Conservation League, Riley Creek Lumber Co., Vaagen Brothers Lumber Co., Fodge Pulp, Inc., Northern Lights Utility Coop., one adjacent landowner, Congressman Bill Sali's representative and several Bonners Ferry RD personnel, including Acting District Ranger Don Gunter, the project leaders and other interdisciplinary members from the district.

The general purpose of this group meeting was to start the process of transitioning the Templeman Hazardous Fuels Categorical Exclusion to a "new" Templeman HFRA EA project and proceed with further development of a proposed action for the new project. The group decided at this time to form two separate collaborative groups for the two projects (Templeman and Twin Skin) due to the distance between the two projects and the feeling that different adjacent landowners would be involved and interested only in the project nearest their residences. The group agreed that the next meeting should involve a field trip to get a better idea on the project needs and to further discuss and develop proposed actions for the two projects. The group agreed on the dates of May 8th and 9th, 2007 for field trips, May 8th would be the date to visit the Templeman project area.

Invitations announcing the May 8th field trip were mailed out to the collaborative group that was formed at the March 8th open house. The group included 26 people representing adjacent land owners, government entities, agencies, utilities, forest products businesses and organizations. A news release was also published in the local Bonners Ferry Herald that invited all interested people to attend. On May 8, 2007, thirteen people attended the field trip. Participants represented Boundary County FireSafe, Boundary County Commissioners, the Idaho Department of Lands, the Idaho Conservation League, Vaagen Brothers Lumber Co., Forest Interface Solutions/Envio Energi (a FireSafe contractor and biomass industry company), a small-scale mechanized logging contractor specializing in small diameter timber stand fuels reduction treatments, and Forest Service personnel, including Acting Ranger Don Gunter, in-coming Ranger Linda McFaddan, the IPNF soil scientist, the project leader and other interdisciplinary team members.

This field trip focused on the possibility and feasibility of adding to the project area a 300-acre "biomass thinning" treatment in the 1979 Templeman Fire plantation, which would remove and utilize small trees cut during what would normally be considered a "precommercial thinning" treatment that typically leave the cut trees unutilized and sometimes piled and burned. Also discussed was the possible need for using a stewardship contract to help finance and accomplish this biomass removal work, as well as to provide a funding source for noxious weed treatments. The group also visited other previously proposed areas under the Templeman CE to discuss the needs and methods for treating those areas.

The group was in general agreement to proceed with a proposed action that included the biomass thinning treatment as well as all the previously proposed treatments, possibly with some minor modifications. The group also decided to look into the possibility of increasing the acres of prescribed fire treatment if there were appropriate areas that had been overlooked previously and also consider any possible watershed improvement work that could be done in Templeman Creek or Meadow Creek.

A scoping letter was then mailed out on June 19, 2007 to 118 individuals, organizations and agencies to gather comments for the proposed action. The comment period ended July 31, 2007, although comments could still be received and considered up to the date of issuing this EA for 30-day comments. A legal announcement for this scoping notice was also published in the Coeur d'Alene Press on June 28, 2007.

The Templeman HFRA EA was also posted on the IPNF Quarterly Schedule of Proposed Actions (SOPA) initially in the April 13, 2007 and all subsequent SOPAs.

Eight comments were received during the scoping period.

Section 1.10 Significant Issues

The NEPA regulations specify that the Interdisciplinary Team (IDT) shall "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review..." 40 CFR Sec. 1501.7(3). Through the interdisciplinary and collaborative process the issues were separated into two groups: Significant Issues and Other Issues.

Significant Issues are those resource issues that are determined through analysis and public involvement as having the most significance resulting from selecting the proposed or no-action alternative. The Significant Issues are those issues that the deciding official and the public should be most aware of when weighing the risks to the resources and people that may result from selecting either alternative.

Other Issues are defined as those resource issues that may have potential for direct, indirect or cumulative effects caused by implementing the proposed action or no-action alternative, but not with a level of significance to support altering the proposed action.

The Forest Service used the public involvement process to identify two Significant Issues. They display the cause and effect relationship that potential implementation of the proposed action would have on a particular resource. Each Significant Issue features one or more indicators that are used to measure the quantitative or qualitative effects to the natural and human environment. Related issues were combined to streamline the analysis.

1.1. Significant Issue #1 – Soil Resource:

There is a risk that implementing the proposed activity or an intense, stand-replacing wildfire would adversely affect soil resources and cause detrimental soil disturbances.

Measurement Indicators:

- Soil Productivity
- Level of detrimental soil disturbance

1.2. Significant Issue #2 – Fire Risk to Life and Property:

There is a risk that, by not implementing the proposed activity, a wildfire could threaten the surrounding adjacent residences, evacuation routes, utilities and community water systems (Bee Line water system and private wells).

Measurement Indicators:

- Expected fire behavior
- Suppression capabilities

Section 1.11 Other Issues

Development of the “design criteria and mitigations” for the proposed action as discussed in Chapter 2 effectively eliminated (through avoidance) or vastly reduced the potential impacts (through mitigation) to many of the resource Other Issues. Additional issues not analyzed in detail include those identified as: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; or 3) conjectural and not fully supported by scientific or factual evidence.

Other Issues include the following, and are discussed to the appropriate level of detail in Appendix C:

1) Threatened, Endangered and Sensitive Wildlife, Fish, Plants and Forest Species of Concern
   Issue Indicator – Impact on individual species and reduction of suitable habitat.

2) Fisheries and Water Resources
   Issue Indicators –
   a. Stream temperature and large woody debris recruitment
   b. Sediment delivery
   c. Water yield and rain-on-snow events.

3) Noxious Weeds
   Issue Indicator – Potential to introduce and spread noxious weeds

4) Allocated Old Growth
   Issue Indicator – Acres of Allocated Old Growth affected by project implementation

5) Cultural Resources
   Issue Indicator – Number of cultural resources impacted by project implementation

6) Promoting Community Assistance
   Issue Indicator – Acres within CWPP identified WUI to be treated, including amount of green tons of hazardous fuels to be removed and made available for utilization and economic benefits through permits, contracts, grants, agreements or equivalent (10-Year Strategy Implementation Plan Goal #4).

7) Scenery (Visual Quality)
   Issue Indicator – Changes to existing visual character

8) Recreation
   Issue Indicator – Changes to current recreational activities

9) Effects on Minority and Low-income Populations
   Issue Indicator – number of minority and low-income people disproportionately affected

10) Inventoried Roadless Areas
    Issue Indicator – Acres in project area

11) Mineral Resources
    Issue Indicator – Impacts on patented mining claims

12) Special Uses
    Issue Indicator – Impacts on special use permittees

13) Transportation System
    Issue Indicator – Number of miles of new road construction or reconstruction

Section 1.12 Applicable Federal Laws And Executive Orders

Shown below is a partial list of federal laws and executive orders pertaining to project specific planning and environmental analysis on federal lands. While most pertain to all federal lands, some of the laws are specific to Idaho. Disclosures and findings required by these laws and orders are contained in Chapter 3 and EA Appendices A, B and C or the Decision Notice for this EA, when a decision has been made.

- Multiple-Use Sustained-Yield Act (MUSYA) of 1960
- National Historic Preservation Act of 1966 (as amended)
- Wild and Scenic Rivers Act of 1968, amended 1986
- National Environmental Policy Act (NEPA) of 1969 (as amended)
- Clean Air Act of 1970
- Endangered Species Act (ESA) of 1973 (as amended)

- Forest and Rangeland Renewable Resources Planning Act of 1974 (as amended)
- National Forest Management Act (NFMA) of 1976 (as amended)
- Clean Water Act of 1977 (as amended)
- American Indian Religious Freedom Act of 1978
- Archeological Resource Protection Act of 1980
- Cave Resource Protection Act of 1988
- Healthy Forests Restoration Act of 2003
- Executive Order 11593 (floodplains)
- Executive Order 11990 (wetlands)
- Executive Order 12898 (environmental justice)
- Executive Order 12962 (aquatic systems and recreational fisheries)
- Executive Order 13112 (invasive species)
- Executive Order 13186 (migratory birds)

Chapter 2 - No Action (Baseline Condition) And Preferred Alternatives

Section 2.1 Introduction

Under HFRA authorities, in order to expedite analyses, proposed projects inside a wildland-urban interface and within 1.5 miles of the boundary of an at-risk community do not require an alternative to the proposed action. However, a no-action alternative is included in order to display the effects (the baseline) associated with not implementing the project. This chapter contains a description of the no-action and proposed action alternatives, a description of mitigation and monitoring measures and a tabular comparison of the no-action and action alternatives.

Section 2.2 Process Used To Formulate Action Alternative

The collaborative group and Interdisciplinary Team (IDT) developed the proposed action to respond to the project purpose and need, the existing Forest Plan objectives, goals, and standards, and public and agency concerns as directed by NEPA. The IDT consisted of Forest Service personnel who have expertise in different natural resource fields in order to provide a diverse, interdisciplinary approach to the project. A list of preparers is included in Appendix E. The final, proposed action was developed through a series of resource evaluations, field visits, IDT meetings, and public interactions. If implemented, the project would be designed and administered in accordance with:

- Forest Plan Standards and Guidelines (USDA, 1987)
- Rules and Regulations pertaining to the Idaho Forest Practices Act (1998)
- INFS Interim Guidelines for Riparian Habitat Conservation Areas (RHCA)
- R1/R4 Soil and Water Conservation Practices Handbook (Forest Service Handbook 2509.22)
- Idaho Water Quality and Wastewater Treatment Requirements (IDAPA 58.01.02) and Clean Water Act
- Forest Service Manuals and Handbooks (FSM and FSH)

Section 2.3 Alternative Descriptions

2.3.1 Alternative 1 – No Action (Baseline Condition)

This alternative reflects the existing condition without any new management activities occurring and provides a baseline for comparing the action alternative. In other words, all current, routine and ongoing management activities would continue to occur under this alternative and no additional action would be taken to respond to the purpose of and need for action identified in Chapter 1.

2.3.2 Alternative 2 – Proposed Action

This alternative references Figure 1 and Table 1 and proposes to reduce fuels by mechanical treatments on 1,200 acres and to reduce pockets of fuel using prescribed fire on 450 acres within this 1,200-acre treatment area. The fuels reduction work would be governed by a timber sale or stewardship contract to remove about 40 to 60 tons per acre of dead standing and down timber, live ladder and crown fuels including sawtimber, pulplogs and other biomass (small trees, tops and limbs) that are excess to other resource needs for maintaining soil productivity, large down woody material for wildlife and to reduce soil disturbance and compaction during treatment activities.

Figure 1 - Proposed Unit Location and Activity Map

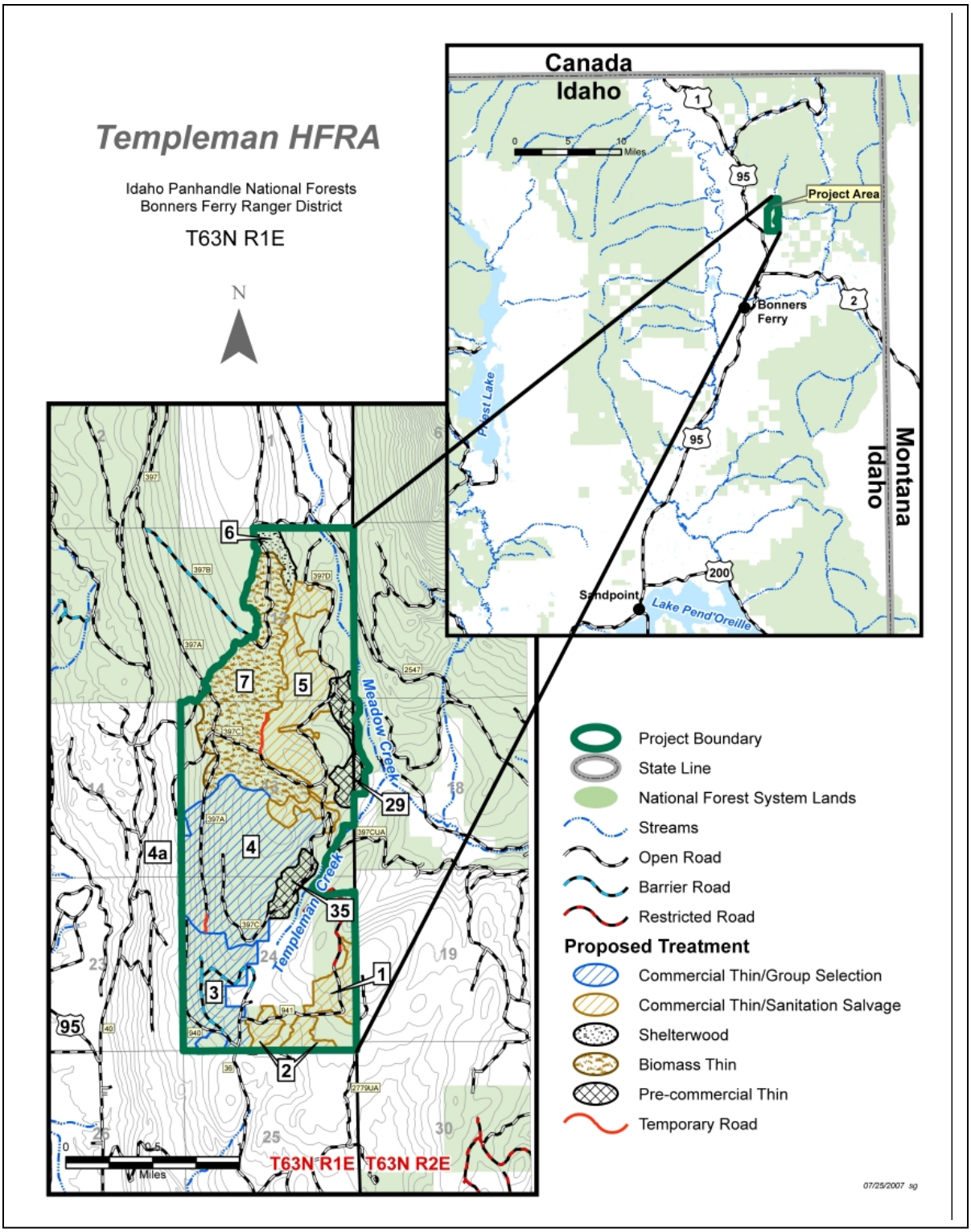


Table 1 - Proposed Fuels Reduction Treatments by Unit

Unit	Acres	Harvest Type and Logging System	Slash Disposal Method	Residual Stand General Characteristics
1	50	Commercial Thin/Sanitation Salvage - Tractor/winter	Grapple pile and burn or optional biomass removal. Machines stay on existing trails, operate on slash mats where available and stay off slopes that exceed 35%.	12 to 30+ inch diameter larch, Douglas-fir, ponderosa pine and cedar
2	42	Commercial Thin/Sanitation Salvage - Tractor/winter	Grapple pile and burn or optional biomass removal. Machines stay on existing trails, operate on slash mats where available and stay off slopes that exceed 35%.	10 to 18+ inch diameter larch, Douglas-fir and cedar
3	140	Commercial Thin/Group Selection Tractor/winter	Underburn	15 to 30+ inch ponderosa pine, Douglas-fir and larch with pockets of advanced regeneration of ponderosa pine, Douglas-fir and larch
4	263	Commercial Thin/Group Selection Tractor/winter	Underburn	15 to 30+ inch ponderosa pine, Douglas-fir and larch with pockets of advanced regeneration of ponderosa pine, Douglas-fir and larch
4a	48	Commercial Thin/Group Selection Skyline/winter	Underburn, optional removal of excess biomass prior to burning.	15 to 30+ inch ponderosa pine, Douglas-fir and larch with pockets of advanced regeneration of ponderosa pine, Douglas-fir and larch
5	201	Commercial Thin/Sanitation Salvage Tractor/winter	Grapple pile and burn or optional biomass removal. Machines stay on existing trails, operate on slash mats where available and stay off slopes that exceed 35%.	10 to 18+ inch larch, Douglas-fir, ponderosa pine, cedar and hemlock
6	26	Shelterwood Tractor/winter	Grapple pile and burn site prep for planting. Machines stay on existing trails, operate on slash mats where available and stay off slopes that exceed 35%. Plant whitepine and larch.	12 to 18+ inch Douglas-fir, larch and also grand-fir and hemlock for snag recruitment
7	300	Commercial "Biomass" Thin Small-scale harvester/forwarder	Mandatory removal of excess biomass, incidental piling using small-scale excavator, where concentrations of tree branches exist. Burn piles. Estimate 1% of unit (approx 3 acres).	6 to 8 inch ponderosa pine, larch, Douglas-fir, white pine and other species
Plantation Units 29 and 35	100	Precommercial Thin - chainsaw - incidental salvage of forest products such as X-mas trees, boughs, etc.	None	6 to 8 inch Larch, Douglas-fir, ponderosa pine, white pine and other species
Incidental hazard tree removal along haul route on FS lands	Estimate total of 10 acres	Individual tree removal from roadsides at widely scattered locations in groups of 1-2 trees in any single spot and within striking distance of road. No off-road equipment necessary. Cable yard to roadside or remove from road surface if they have fallen on road from wind or other weather event.	Lop and scatter	No detectable change from existing condition.
Total Acres	1,180			

Connected Actions

In addition to the activities listed in Table 1 above, the following activities would also take place:

1) Some of the excess trees cut during the precommerical thinning treatments in Units 29 and 35 could possibly be utilized (salvaged) for special forest products (i.e. Christmas trees, boughs used for wreaths, decorative arrangements, etc). None of these types of forest product removals would involve the use of heavy equipment.

2) In the event that incidental residual tree mortality occurs after completion of the project as a result of windstorms, ice-damage, fire, insects or disease in Units 1, 2, 3, 4, 4a, 5, 6, 7 and associated roadsides used for hauling, salvage may occur using the existing skid trails and landings, or from roadsides using cable yarding and not requiring off-road equipment, while adhering to design criteria established for this project. This activity could occur until superceded by another management decision in the affected area.

3) Noxious weed treatments have been occurring and will continue in the future in and around the project area as authorized through the Bonners Ferry Ranger District Noxious Weed Management Projects FEIS (September 1995). Noxious weed treatments could be funded by this project through Knutson-Vandenberg (KV) deposits or made a contractual requirement during implementation of this project. The treatments could occur anywhere within the project area that the district noxious weeds program manager determines the need and as funding becomes available.

Section 2.4 Design Criteria And Mitigations

During the design phase of the project various measures were incorporated to lessen potential impacts and to avoid resource damage. These measures are detailed in the descriptions below. Specialist reports in Appendix A, B and C detail and rate the effectiveness of these design criteria mitigation measures for the proposed action.

1) No new permanent roads will be constructed. Existing access roads, including Forest Roads #397A, #397C, #397D, #940, #940-UA, #940-UB and #941 will be used. Segments of some of these roads, totaling 9.9 miles, will require minor reconstruction prior to use. The road work includes roadside brushing, blading, ditchline cleaning and shaping, spot graveling and ditch relief pipe installation and replacement at locations recommended by the project IDT and removal of hazard trees along the haul routes. It is anticipated that up to one-half mile of temporary roads may be needed to be built in Units 4a and 5. The temporary roads would be obliterated by the contractor following use. The obliteration would restore the segments to their pre-roaded condition and would be revegetated and covered with slash to prevent off-road vehicle use.

2) Logging operations in all units except Unit 7 will be restricted to the winter months (approximately December through March) to help minimize the risk of further soil compaction and encroachment of noxious weeds that surround the project area. Unit 7 will be restricted to small-scale lightweight equipment and will require the contractor to conduct pre-treatment of noxious weeds prior to commencing operations.

   - For tractor-yarded Units 1, 2, 3, 4, 5 and 6:

     1) Where present, existing skid trails will be used. For units 1, 2, 3 and 4 no new skid trails or landings will be allowed in order to keep from exceeding Forest Plan standards for soil compaction and disturbance.

     2) All new skid trails will be agreed upon and designated on the ground by the Purchaser and Forest Service before felling begins.

     3) Where terrain is conducive, trails will be spaced at least 100 feet or more apart.

     4) Post-harvest, all utilized skid trails will be either covered with slash and randomly placed logs (on contour) to increase the microtopography needed to reduce runoff, stabilized with waterbars, or a combination thereof.

     5) Excavated skid trails, if needed in Units 5, 6 and 7 will be re-contoured and seeded after logging is completed. No excavated skid trails will be permitted in Units 1, 2, 3 and 4.

6) Operating equipment will avoid moist or wet depression areas unless properly protected by snow or frozen conditions. This specifically applies to units 2, 4 and 5 where shallow depth to groundwater occurs.

- Also, during harvest operations, any one of the following conditions will be contractually required for tractor-yarded Units 1, 2, 3, 4, 5,and 6:
  1) a 24-inch snow layer or 18 inches of settled snow or;
  2) a slash mat in combination with 12 inches of settled snow or;
  3) frozen ground to a depth of 4 inches

- For Unit 4a, skyline yarding shall include contractual requirements to suspend the leading end of logs.

- Also for Unit 4a, existing corridors will be used.

- For Unit 5, designate the unit boundary at least one chain (approx 67 feet) back from the top edge of the cut slope on FR 397D in those locations where wetlands exist below the road outside of the treatment area (UTM 11U0553767 5407648), in order to retain the stability and hydrologic function of the wetlands.
- For Unit 7, small-scale harvesting, forwarding and slash piling equipment (i.e. equipment less than 10 feet wide, measured from outside edge of tracks or wheels) will be required and will operate on slash mats in order to minimize damage to small diameter residual trees expected to be left on about a 12 to 15 foot spacing. The smaller and lighter machinery should result in much less compaction compared to equipment typically used for sawtimber-size trees since equipment width is lessened (Johnson et al. 2007), especially if passes are limited. For comparison, "standard-sized" harvesting equipment vary in width between 10-12 feet and weigh between 50-60,000 lbs, whereas the small-scale machines vary in width between 7-10 feet and weigh less than 26,000 lbs. A special contract provision will be developed for restricting the size and type of equipment to be used in this unit.

3) For Units 5, 6 and 7, existing skid trails and landings will be utilized where appropriate in order to maintain current soil compaction levels. Any new skid trails will be agreed upon by the Forest Service and Purchaser. All skid trails utilized will be covered with residual slash, waterbarred and seeded as needed upon completion of the sale.

4) Units 1 and 2 currently exceed soil quality standards by one to two percent, respectively. Given the soil characteristics in these two units, mitigation measures are possible. Therefore, once proposed harvest and slash treatment activities are completed, utilized skid trails would be decompacted, thereby moving these two units towards a net improvement in soil quality. Improvement efforts also include addition and incorporation of organic matter, seeding, and weed control. Decompaction would provide for enhanced hydrologic function and would initiate a recovery process that otherwise may be prolonged as soil compaction from past and proposed harvest activities persist.

5) Equipment used for logging, slash piling, biomass removal and road reconstruction will be required to be pressure-washed in all units prior to being allowed on the project area. Currently suitable contract provisions for washing equipment for noxious weed control purposes will be used.

6) Based on average results obtained from three separate field surveys conducted for soils, fuels and silvicutural analysis, Forest Plan Standards for maintaining an adequate supply of large down-woody material for soil productivity and nutrient recycling are currently being met in the project area and will be maintained (EA Appendix A and B soils and fuels analysis, and project file recon notes).

   a) The latest soil nutrient management recommendations from the Intermountain Forest Tree Nutrient Cooperative (IFTNC) and Rocky Mountain Research Station (RMRS) would be applied as appropriate to each activity area where organic material is removed. Slash would be left to recycle nutrients back into the soil until site-prep occurs. Grapple piling equipment would operate on slopes under 35 percent.

b) As this is a hazardous fuels reduction project, determination of fire risk where slash is left untreated for prolonged periods of time will be made by the district fire management officer. Where fire risk is considered high, flexibility will be given to treat slash prior to it being left for several months.

c) Downed woody retention levels will be maintained at the lowest recommended levels due to concern for fire risk in the interface area. For the moist forest habitat types where harvest is proposed in Units 1, 2, 5 and 6, Graham et al (1994) recommend retaining 17-33 tons of downed woody material greater than three inches in diameter. For the drier habitat types associated with Units 3, 4, 4a and 7 the recommended retention level is 5-15 tons.

d) For Units 1, 2, 5 and 6 grapple piling or biomass removal machinery will stay on existing trails, operate on slash mats where available and stay off slopes that exceed 35%.

e) An alternative slash disposal method for Units 1, 2, 4a, and 5 will be to remove slash, excess to the desired Graham guideline levels and following at least one wetting season, at the option of the timber sale purchaser to utilize this material for biomass energy, biofuels, or other uses. The need for post-harvest slash piling and burning would be eliminated in these units.

f) Prescribed underburning and burning of numerous small rather than few large slash piles would take place when the upper surface inch of mineral soil has a soil moisture content of 25 percent by weight or 100 percent duff moisture.

7) The District would manage for the snag resource by following the "Regional Snag Management Protocol" (January 2000), which calls for retention of 6 to12 snags per acre with 2 to 4 snags/acre greater than 20 inches in habitat types associated with Units 1, 2, 5 and 6 and 4 snags per acre over 20 inches in diameter in habitat types associated with Units 3, 4, 4a and 7. Based on a recent reconnaissance cruise conducted for the project, Units 1, 2, 5 and 6 contain about 8 snags per acre over 10 inches in diameter, including about 1 snag per acre over 20 inches. Units 3, 4 and 4a currently contain about 9 snags per acre over 10 inches in diameter, but only 2 per acre that are over 20 inches (Project File, Recon Documents). Unit 7, the proposed biomass thinning unit, currently has less than 1 10-inch or greater diameter snag per acre due to this being a 30-year old plantation with average tree diameters in the 6 to 7-inch range. The Forest Plan standard for snags is 3 per acre that are 10 inches or larger in diameter for Management Area 1 lands and 4 per acre (same size classes) for Management Area 4 lands. The current snag composition is well within the level recommended by the Northern Region protocol, except for snags over 20" dbh. This is due to the past sanitation salvage and firewood cutting treatments conducted in the area over the past several decades that removed the largest dead and dying trees. The proposed treatment is designed to retain large-diameter live trees and also dead trees over 16 inches in diameter, especially ponderosa pine, western larch, white pine and Douglas-fir. These live residual trees can be managed for snag recruitment trees to increase the number of 20-inch-plus diameter snags in the future.

The wildlife biological evaluation for this project (EA Appendix C) included the following conservation requirements, recommendations and design criteria, which would be incorporated into project implementation:

- Goshawk Nest Site Protection – Additional nest searches would be conducted during project layout and implementation. If a goshawk nest were discovered, mitigation measures would be implemented to help ensure that nest sites and post-fledgling areas are receiving minimal disturbance. A no-activity buffer (greater than 150 foot radius) would be placed around each known active nest tree. In addition, a 30-acre no activity buffer would be placed around each nest area to provide long-term nesting habitat (Reynolds et al. 1992).

  Purchasers operations and related Forest Service activities would be suspended within 0.5 mile distance of active nest areas from March 15 to August 15 to (1) promote nesting success and (2) provide foraging opportunities for adults and fledgling goshawks during fledgling-dependency period. Activity restrictions would be removed after June 30 if the Forest Service wildlife biologist determines the nest site is inactive or unsuccessful.

- Wildlife Tree Retention – Snags and live tree replacements would be retained where opportunities exist in treatment units at levels recommended by the USFS Region 1 Snag Protocol (see previous discussion).

While retention objectives are accounted for on a treatment level scale, some snags would be represented on every 10 acres of treatment, in clusters or clumps where feasible, to promote good distribution of snags. Large diameter snags (greater than 16 inches diameter) that are felled for safety reasons would remain on site to provide for large woody debris recruitment and long-term site productivity. Selection of snags and live tree replacements would emphasize practices that assure the highest probability for long-term retention (Bull et al. 1997). The high hazard snags and snags in the advanced stages of decay would not be used to meet retention objectives. Retention practices would focus on ponderosa pine, western larch, Douglas-fir and western red cedar trees, especially veteran or relic ponderosa pine and western larch trees. Trees killed by root disease should be avoided, where possible, to meet retention objectives because of their rapid deterioration and resulting fall-down rate.

- Grapple Piling – Where grapple piling is prescribed for fuel reduction, leave an average of one to three slash piles per acre unburned to provide habitat for small forest animals (e.g. snowshoe hares), while still meeting fuels reduction objectives.

- Road Design: To retain habitat for snag-dependent species and species dependent on large-diameter trees, the location of the proposed temporary road would ensure, whenever practical, that veteran and relic survivor trees and snags would not be removed during construction.

- Skid Trail and Cable Corridor Location: To maintain habitat for snag-dependent species, the timber sale or contract administrator would ensure, whenever practical, that the design of skid trails and cable corridors would avoid veteran and relic fire survivor trees and snags.

- Road Management: The temporary roads in Units 4a and 5 would be fully decommissioned following use in accordance with the Area Road Management Plans and the IPNF Forest Plan. Existing roads, which are currently restricted and utilized for this project, would be returned to their pre-project road status.

- Maintaining Veteran and Relic Structure: No allocated old-growth stands exist within the project area. However, to maintain habitat for snag-dependent species, areas within treatment units that contain small pockets of older, large diameter structure will be thinned from below or not treated. These unique areas will be managed on a case-by-case basis. Vegetation type, moisture regime, logging system, wildlife species suitability and surrounding treatments will all be considered.

- Protection of Cedar Swales: Microsites of western red cedar having diameters greater than 12 inches dbh will be retained.

- Retention of Hardwood Trees: To maintain forest species diversity and wildlife habitat, aspen and birch trees will not be harvested for pulp. If trees of these species need to be cut for safety reasons, they will remain on site for coarse woody debris and long-term site productivity. Conifers in and around aspen and birch patches will be harvested or slashed to reduce competition for water, sunlight, nutrients as well as to help provide fuel for underburning. Where appropriate, individual trees may be cut or pushed over to encourage sprouting. Whenever possible, these areas will be underburned to stimulate sprouting. This strategy will provide vegetative diversity, which benefits various wildlife species.

- Threatened, Endangered, and Sensitive Wildlife Species Protection: If any threatened, endangered, or sensitive species are located during project layout or implementation, management activities will be altered to include proper protection measures. Timber sale contract provision B6.24 (Protection of Plants, Animals, Cultural Resources, etc.), or its equivalent stewardship contract provision would be included.

8) No-harvest buffer zones for lakes, streams, wetlands and other riparian habitat have been included in and adjacent to harvest units as designed by the project fish biologist, hydrologist, botanist and soil scientist utilizing INFISH standards and other site-specific recommendations (including BMPs). Approximately 10 acres of the precommercial (hand-chainsawing) thinning treatments will encroach in a RHCA. The fisheries analysis determined that the thinning activities would not directly affect temperature, sediment delivery, habitat cover/complexity, pool frequency, habitat connectivity, or width/depth ratios because there are no

ground-disturbing activities scheduled to occur within these RHCAs (see Chapter 3 and fisheries BA/BE report in Appendix C).

Section 2.5 Monitoring

Information gathered before, during and after implementation of activities is used to determine the effectiveness of the project's design and associated mitigation measures. This establishes a feedback mechanism so management can develop and employ an adaptive learning curve. Monitoring is done at recurring intervals as a basis for Forest Plan implementation. Project effectiveness monitoring is done by sampling specific projects at specified time intervals. The activities associated with this proposed action would include monitoring of the following:

Temporary Road Obliteration: The effectiveness of road obliteration and erosion control would be periodically checked by hydrology, soils, road management, or timber personnel.

Soil Compaction: The effectiveness of prescribed Best Management Practices (BMPs) of winter logging, decompacting skid trails utilized in Units 1 and 2 and redistributing residual slash over skid trails to help prevent erosion would be checked by soils, hydrology, timber, or fisheries personnel.

Down Woody Debris: During project contract administration the amount of debris left in the mechanical treatment units needs to meet recommended minimum levels. Accomplishment of this activity would be monitored by timber, fuels, or soils personnel.

Northern Goshawk: Goshawk surveys for occupied nesting and/or post-fledging habitats were completed in the project area during 2006 and 2007. No currently suitable nesting habitat would be impacted by this proposal and no goshawks were found or are known to be using the project area or immediate vicinity for reproduction. Timber Sale Administration and wildlife personnel would continue to monitor the project area for goshawk presence during project implementation.

Noxious Weeds: Monitoring by district personnel (noxious weed program manager, botanist and others) for noxious weed occurrences within the project area would continue during and after project implementation. Any newly discovered noxious weeds would be treated as funding becomes available.

Section 2.6 Alternative Comparison

Table 2 summarizes and contrasts the environmental consequences. Potential actions and outputs would cause these consequences. Chapter 3 discusses each environmental consequence in detail.

Table 2 - Alternative Comparison of Project Activities

	No-Action	Proposed Action
Issue 1 - Soils		
Soil Productivity	No direct effects to the soil resource would occur with No Action since there would be no road construction, logging, or fuel treatment activities. There would be no compaction or displacement beyond what currently exists. Indirectly, the occurrence of a high intensity wildfire would have an increased potential for impacts to soils and soil productivity in severely burned areas, especially since the risk of soil erosion increases proportionally with fire intensity. Other effects would include the potential loss of organics, loss of nutrients, and a reduction of water infiltration. Burns that create very high soil surface temperatures, particularly when soil moisture content is low, result in an almost complete loss of soil microbial populations, woody debris, and the protective duff and litter layer over mineral soil. Nutrients stored in the organic layer (such as potassium and nitrogen) can also be lost or reduced through volatilization and as fly ash. Fire-induced soil hydrophobicity is presumed to be a primary cause of the observed post-fire increases in runoff and erosion from forested watersheds. If hydrophobic soils result from a severe, high temperature fire, moderate surface erosion could occur but the potential for mass failures would be low to moderate because of the Templeman Project Area's overall landtype characteristics; however, localized slope movement could be possible.	To reduce the impacts to soils and soil productivity, the Proposed Action utilizes Soil and Conservation practices as described in the Soil and Water Conservation Practices (SWCP) Handbook FSH 2509.22 (USDA FS 1988b). This handbook outlines Best Management Practices (BMPs) that protect the soil and water resources at a higher level than do existing Idaho Forest Practices rules and regulations, thereby incorporating all Idaho state standards. The BMPs would have a high effectiveness in minimizing soil compaction and displacement, address seeding of disturbed areas, limit operations when soil moistures are high, and address conduct of logging. "Design Criteria and Mitigation" would also be implemented as part of the Proposed Action to ensure that activities are consistent with Forest and Regional guidelines for soil compaction, displacement, and nutrient retention.
Cumulative detrimental soil disturbance (ac and % of defined activity area)	127 acres or 11%	153 acres or 13%
Issue 2 – Fire risk to life and property		
Expected Fire Behavior	Under the existing fuel conditions, surface fires in the event of a summer wildfire would exhibit behavior that would include **predicted flame lengths greater than 5 feet and the limit for safe direct attack by firefighters is 4 feet**. The condition of the project area is such that a crown fire could be supported due to the current surface, ladder, and crown fuels. The predicted flame lengths coupled with the low canopy base heights of 1-3 feet would equate to a high probability of torching of the canopy (>90%), thus potential mortality to the overstory trees would be between 60-100%. Crowning index of 16 - 20 mph.	Expected flame lengths for surface fires reduced to less than 2 feet. Canopy base height raised to about 40 feet. Probability of torching reduced to <15%. Crowing index of 55-100+ mph.
Suppression Capabilities	Under the expected fire behavior, suppression capability would be limited to direct attack using ground machinery and aerial resources only. Expected flame lengths would be greater than the limit that can be safely attacked by hand crews. Fast moving fires are generally more difficult to control, and in the wildland urban interface, create an even greater concern as fires may threaten homes and other structures as well as escape times out egress routes.	Full range of suppression capabilities, including use of hand crews.

Chapter 3 Affected Environment And Environmental Consequences

Section 3.1 Introduction

The existing condition of resources that would be affected by implementation of the action or no action alternative, and the potential effects of implementing either alternative on these components, are discussed below. Within each resource topic, individual analysis areas are described and serve as a basis for the determination and disclosure of the potential direct, indirect and cumulative effects on that resource. Effects are quantified where possible. The means by which potential adverse effects would be reduced or mitigated are described. Past, present, and future activities considered in the cumulative effects analysis are listed in Appendix D. Discussions of resources and potential effects take advantage of information included in the IPNF Forest Plan, other project EAs, project-specific resource reports and other sources as indicated. The CEQ regulations implementing NEPA include specific categories to use for the analysis of environmental consequences. The following are applicable to the proposed project and form the basis of analyses.

• Direct, Indirect and Cumulative Effects. Direct environmental effects are those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity, but could be significant in the foreseeable future. Cumulative effects result from incremental effects of actions, when added to other past, present, and reasonable foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects could result from individually minor, but collectively significant actions taking place over a period of time.

• Unavoidable Adverse Effects. Implementation of an alternative could cause adverse environmental effects that cannot be effectively mitigated or avoided. Unavoidable adverse effects often result from managing the land for one resource at the expense of the use or condition of other resources. The application of Forest Plan standards and guidelines, BMPs and project-specific mitigation measures usually help to limit the extent, severity, and duration of potential adverse effects. Potential effects are identified and disclosed.

• Short-term Use and Long-term Productivity. Short-term uses, and their effects, are those that occur annually or within the first few years of project implementation. Long-term productivity refers to the capability of the land and resources to continue producing goods and services long after the project has been implemented. Under MUSYA and NFMA, all renewable resources are to be managed in such a way that they are available for future generations. Potential gains and losses in the short term and long term are discussed.

• Irreversible and Irretrievable Commitments. Irreversible commitments are those that cannot be reversed, except perhaps in the extreme long term. A classic example is when a species becomes extinct. Irretrievable commitments are those that are lost for a period of time. If a temporary road is constructed through the forest, the timber productivity of the right-of-way is lost for as long as the road remains. Irreversible and irretrievable commitments are discussed as applicable, although not usually by use of those terms.

• Available Information. There is less than complete knowledge about many resources and their biophysical, social and economic interrelationships. The ecology, inventory and management of wildlands are complex and developing sciences. However, basic data and central relationships are sufficiently well established for resource managers to adequately assess and disclose the possible adverse environmental consequences associated with the proposed project and for the deciding official to make a reasoned choice between the proposed action and no action alternatives. New or improved information would be very unlikely to reverse or nullify these understood relationships.

The following resource topics were analyzed in detail and are summarized below. The complete analysis reports and supporting documents are contained in EA Appendices A (soils), B (fuels), C (other issues) and the project file.

Section 3.2 Soil Resource (Significant Issue 1)

3.2.1 Analysis Area

The analysis area for determining direct, indirect, and cumulative effects to the soil resource is the Templeman HFRA activity areas. The scope of the project only affects soil resources within this area. One exception that calls for evaluation beyond an activity area is slope stability, which requires a closer look at the adjacent terrain outside of activity areas to determine if cumulative effects from past management activities and roads are adverse.

Measurement Indicators:

- Soil Productivity
- Level of detrimental soil disturbance

3.2.2 Affected Environment

The parent geology ranges from glacial or alluvial deposits to small outcrops of mafic intrusions in the lower elevation southeastern parts (Units 1 and 2) and east facing side slopes (Units 3, 4, 5, and 6) and portions of granodiorite in the higher elevation western units (Units 3, 4, 5, 6 and 7) (PF Doc. SOIL-9 and 17). Throughout the Resource Area, the soil has developed in a mosaic pattern as dictated by topographic relief, vegetation, and aspect. Soils are generally grey to reddish brown to light brown ash-influenced silt loams with rock content of ~0 to 40% that is generally increasing at a depth of 6 to 12 inches below the surface on most slopes. Soils are often not very deep due to bedrock and boulders just below the subsoil, especially in the eastern part of Units 1 and throughout Units 3, 4, 4a, 5, 6 and 7. Soil depth increases on the lower lying parts of Units 1 and 2 where glacial material dominates or where benches allow for a greater accumulation of soil.

Under the predominant timber stands, silt loam textured ash capped soil has developed. The volcanic material accumulated from several of the Cascade volcanoes eruptions with most of the ash originating from Mt. Mazama (Crater Lake) in Oregon about 6,700 years ago. The uppermost part of the ash is usually enriched with organic matter that is incorporated into this part of the soil and has a high water- and nutrient-holding capacity, both of which are important for soil productivity, while the subsoils are not as fertile.

3.2.3 Other Conditions

Forest Plan direction states that soil resources will be managed to maintain or improve soil productivity (LRMP IV-71). Regional guidelines recommend that at least 85 percent of an activity area be maintained in a non-detrimentally disturbed condition. An activity area is defined as a land area impacted by a management activity. It may be a harvest unit within a timber sale area or a prescribed burn unit (FSH 2554.03, R1 Supp. 2500-99-1). Detrimental soil disturbance is defined as the alteration of natural soil physical characteristics that result in immediate and/or prolonged violations of off-site resource quality standards. Soil compaction, puddling, and displacement are examples of detrimental soil disturbance. It can also occur after fire when soils are severely burned and the entire organic soil surface is consumed to bare mineral soil. The analysis area for determining detrimental soil disturbances from management actions consists of the acres of past and proposed timber harvesting, thinning, and burning within the proposed activity areas, excluding system roads.

The proposed units were field checked in 2005, 2006 and 2007 and data was recorded to estimate the degree of soil disturbance. Onsite assessment followed guidelines in Niehoff (2002) and included shovel tests and digging of holes on random transects to determine compaction, organic matter depth, and coarse-woody debris content. Transects were also supplemented by visual observation and photos during the walk-through. Existing conditions and potential impacts for the Proposed Action are summarized in the following table Soil - 1 below:

Table 3 - Soil -1: Summary of existing conditions and potential impacts for the Proposed Action following guidelines in Niehoff (2002; PF SOIL-44).

						Predicted Impact from Temporary Road Construction		Potential Detrimental Disturbance	
Unit	**Activity Area (acres)**	**Proposed Treatment**	**Proposed Logging System**	**Proposed Slash Treatment**	**Existing Condition % ****	**Proposed Temp Road Construction (miles)**	**Estimated Road Disturbance (acres) +**	**Estimated Acres***	**In Unit Total %**
1	47	CT/SS	GB	GP^	16			8	16
2	44	CT/SS	GB	GP^	17			7	17
3	145	CT/GS	GB	UB	17			25	17
4	266	CT/GS	GB	UB	18			48	18
4a	51	CT/GS	S	UB^	4	0.11	1.3	4	9
5	199	CT/SS	GB	GP^	6	0.24	0.6	21	10
6	26	ST	GB	GP	9			3	10
7	289	Bio/Thin	GB	Biomass removal	8			38	13
29	58	PCT	Hand fell	None	-			0	0
35	33	PCT	Hand fell	None	-			0	0
Total	**1158**					**0.35**	**1.9**	**153**	

GB – Ground Based
S – Skyline
CT – Commercial Thin
SS – Sanitation Salvage
GS – Group Selection
ST – Shelterwood
PCT – Pre-commercial Thin
GP – Grapple Pile
UB - Underburn

* Refer to Table SOIL-3 (Soils Specialist Report, Appendix A) and PF SOIL-6 for coefficients used to predict potential detrimental disturbance for proposed logging and slash treatment scenarios including burning and piling. The level of disturbance increase also depends on the amount or lack of existing skid trails. Activity units that have had little prior disturbance will show a greater incremental increase in potential detrimental disturbance than those units that already contain a network of existing skid trails. Little to no increase in disturbance is expected there because equipment would re-use existing skid trails. Additionally, all ground-based units (except Unit 7) will be winter logged for further resource protection. Rounding errors may occur.
**Existing detrimental disturbance includes impacts from old non-system roads/trails present in some of the units.
^Removal of biomass after overwintering of slash is a purchaser option.
+Assuming an avg. width of 30 ft. The temp roads will be fully obliterated post-harvest.

The majority of existing impacts occur on Units 1, 2, 3, and 4 which have been treated during several timber sales over the past three decades and most likely during earlier operations in the 1930s for which no record exists (EA Appendix D). Four out of the seven proposed units exceed the Regional Soil Quality Standards by 1 to 3 percent. It should be noted though that the previous activities that contributed to exceeding the current 15% soil disturbance standards were designed to meet 20% standards at that time (pre-1999), which they met.

3.2.4 Alternative 1 – No Action

Direct and Indirect Effects

With No-Action, no new management-induced detrimental soil impacts would occur in the Templeman HFRA Project Area. Stands currently at high mortality risk would not be treated, which may increase insect infestation levels and associated risks of stand loss due to wildfire, severe burning, erosion concerns, and loss of soil nutrients. The promotion of more fire-resilient species, such as western larch and ponderosa-pine, would not occur, leaving the area susceptible to fires that would be too intense for direct attack with hand-crews. Several timber stands would continue to harbor increased fuel loads and move towards moderate to higher risks of considerable losses.

No direct effects to the soil resource would occur with No Action since there would be no road reconstruction, logging, or fuel treatment activities. There would be no compaction or displacement beyond what currently exists. Throughout the silvicultural landscape, tree mortality from pathogens, insects, and weather events would continue as in the past, which has a direct influence on the area's recycling of organic matter and changes in fuel loading. In moister habitat sites, increase in organic matter has a more beneficial function to overall soil productivity because it

fosters formation of ectomycorrhizae in the root system that enhances nutrient and water uptake (Graham et al. 1994). In dry habitat types, increases of organic matter may result in a negative response because organic materials are likely too dry for ectomycorrhizal growth and can reduce natural regeneration of dry sites species adapted to a habitat with shorter fire return intervals.

As the fire risk increases over time due to tree mortality and higher fuel loading, the introduction of weeds and unwanted flora following a fire could lead to higher competition between less desirable and native vegetation (Erickson and White 2007). In the absence of such a hot fire, nutrients would be retained on site. Areas currently populated with weeds would not be as likely to be treated in the near future with the No Action alternative, due to limited available appropriated funding for weed treatments.

Given the absence of fire over numerous decades and increased fuel loads in many parts of the project area (Fuels report, EA Appendix B), the chance of a wildfire occurring could be enhanced if an ignition starts in an untreated area during extreme dry weather conditions (Heyerdahl et al. 2007). The proposed vegetation and fuels treatment in the project area would not necessarily prevent wildfires from occurring, but would increase the ability to suppress such a fire should ignition occur in treated areas (Maurer 2007). Vegetation and fuel treatments would reduce the chance that a wildfire could have as severe of an effect on the soils and surrounding private property in treated areas as it could in untreated areas because there would be a reduction in the tons per acre of dead and dying fuels on those treated sites.

The occurrence of a high intensity wildfire would have an increased potential for impacts to soils and soil productivity in severely burned areas, especially since the risk of soil erosion increases proportionally with fire intensity (Megahan 1990). Other effects would include the potential loss of organics, loss of nutrients, and a reduction of water infiltration (Wells et al. 1979). Burns that create very high soil surface temperatures, particularly when soil moisture content is low, result in an almost complete loss of soil microbial populations, woody debris, and the protective duff and litter layer over mineral soil (Hungerford 1991; Neary et al. 2005). Nutrients stored in the organic layer (such as potassium and nitrogen) can also be lost or reduced through volatilization and as fly ash (DeBano 1991; Amaranthus et. al. 1989).

Fire-induced soil hydrophobicity is presumed to be a primary cause of the observed post-fire increases in runoff and erosion from forested watersheds (Huffman et al. 2001). Though hydrophobicity is a naturally occurring phenomenon that can be found on the mineral soil surface, it is greatly amplified by increased burn severity (Doerr et al. 2000; Huffman et al. 2001; Neary et al. 2005).

Soil hydrophobicity usually returns to pre-burn conditions in no more than six years (DeBano 1981). Dyrness (1976) and other studies have documented a much more rapid recovery of one to three years (Huffman et al. 2001). The persistence of a hydrophobic layer will depend on the strength and extent of hydrophobic chemicals after burning and the many physical and biological factors that can aid in breakdown (DeBano 1981). This variability means that post-fire impacts on watershed conditions are difficult to predict and to quantify.

If hydrophobic soils result from a severe, high temperature fire, moderate surface erosion could occur but the potential for mass failures would be low to moderate because of the Templeman Project Area's overall landtype characteristics; however, localized slope movement could be possible. The areas of primary risk after a severe burn include some of the steep slopes on the west side and east-facing slopes and drainages above the wetlands in the mid-section of the project area. Following a severe fire, rehabilitation efforts to mitigate the fire's effects on erosion and sediment delivery would be performed as funding became available.

Cumulative Effects

Past, current, proposed and potential activities (Appendix D) that could affect critical components of the soil resource include past timber harvest activities, wildfire suppression, firewood cutting and noxious weed treatments. The level of cumulative detrimental soil disturbance from past harvest activities is calculated to be approximately 11 percent (127 acres) of the activity area. Considering all of the above activities the cumulative risk to soil resources in the project area is low.

3.2.5 Alternative 2 - Proposed Action

Direct and Indirect Effects

The direct and indirect effects of the Proposed Action on the soil resource were assessed based on their potential to create detrimental impacts and to affect soil productivity. To reduce the impacts to soils and soil productivity, the Proposed Action utilizes Soil and Conservation practices as described in the Soil and Water Conservation Practices (SWCP) Handbook FSH 2509.22 (USDA FS 1988b). This handbook outlines Best Management Practices (BMPs) that protect the soil and water resources at a higher level than do existing Idaho Forest Practices rules and regulations, thereby incorporating all Idaho state standards.

The techniques and their effectiveness are documented in several publications (Seyedbagheri 1996; Lynch and Corbett 1989 and 1990; Idaho DEQ 2001). The BMPs would have a high effectiveness in minimizing soil compaction and displacement, address seeding of disturbed areas, limit operations when soil moistures are high, and address conduct of logging. "Design Criteria and Mitigation" would also be implemented as part of the Proposed Action to ensure that activities are consistent with Forest and Regional guidelines for soil compaction, displacement, and nutrient retention (Chapter 2, Section 2.4, EA).

Direct and Indirect Effects of Harvest Treatments – The Proposed Action proposes commercial thinning/group selection on 462 acres, commercial thinning/sanitation salvage on 290 acres, irregular shelterwood cuts on 25 acres, biomass thinning on 290 acres, and precommercial thinning on 91 acres by utilizing a combination of ground-based harvest (1016 acres or 88 percent), skyline yarding (51 acres or 4 percent), and hand felling (91 acres or 8 percent) (Table 4 SOIL-2; PF Doc. SOIL-6). The post-harvest fuel treatments in activity areas consist of a combination of underburns (462 acres), lop and scatter (380 acres), and grapple piling (316 acres) (Table 4 SOIL-2). Harvest activities would occur in the winter during adequate frozen or snow conditions for all activity areas with the exception of Unit 7 which is scheduled for summer operations.

Table 4 - SOIL-2. Distribution of harvest treatments for the Proposed Action.

Treatment	Proposed Action
Skyline	51
Tractor	1016
Hand fell	91
Total	**1158**
Underburn	462
Grapple pile	316
Lop and Scatter	380
Total	**1158**
Commercial Thinning/Group Selection	462
Commercial Thinning/Sanitation Salvage	290
Irregular Shelterwood	25
Pre-commercial Thin	91
Biomass Removal	290
Total	**1158**

The proposed vegetation management activities have the potential to cause soil disturbance, such as compaction, by detrimentally affecting an estimated 153 acres from a long-term productive growing state (Table 3 SOIL-1; PF SOIL-6 and 11). The disturbance is predicted to occur primarily in activity locations subjected to ground-based logging. When considering all harvest activities within the 1,158 acres of activity areas, the total disturbance level for the proposed action is ~13 percent. Removal of infrequent roadside hazard trees is not expected to have any short- or long-term detrimental effects on soil productivity. Results of disturbance calculations are included in the Project File (Doc. SOIL-6 and 11).

Fuels reduction proposed for this project consists primarily of ground-based logging which, based on past monitoring, would result in an overall soil disturbance level of ~10 percent for winter-logging in each activity area, excluding existing disturbances, and ~13 percent for summer logging in Unit 7 (Table 3 SOIL-1). As previously discussed, ground-based logging can have the most detrimental effect to the soil resource. "Design Criteria and Mitigation" in addition to BMPs would be used to decrease the effect of ground-based yarding systems (Chapter 2, Section 2.4, EA).

Table 3 SOIL-1 displays harvest units and their assigned logging prescription for the Proposed Action. Units 1, 2, 3, and 4 exceed the detrimental disturbance limit of 15 percent due to existing roads and trails from previous management activities. Based on these monitored existing conditions and estimated potential impacts, proposed harvest Units 1, 2, 3, and 4 should therefore receive the highest attention levels to ensure that proper design features are used to meet required soil quality standards. This would be accomplished by using only the existing skid trails and landings (no additional skid trails or landings), using slash mats whenever possible, in addition to proceeding with harvest operations during the winter season when appropriate frozen and/or snow conditions are present.

The Proposed Action could increase the amount of compaction and displacement of soils in some of the proposed treatment units where ground-based equipment is used for harvest and fuels reduction activities. In addition, underburning can impact soils if proper procedures are not followed, including maintaining adequate levels of soil moisture. Severe burning and ground disturbance could also encourage weed infestation. Protective design features (Chapter 2, Section 2.4, EA) are therefore required in order to lessen compaction and disturbance impacts to the soils in activity areas. These include winter logging in all but one unit (Unit 7, which will use small-scale light weight equipment) and use of slash mats, existing roads, and skid trails whenever possible.

Currently, seventeen proposed landings associated with skyline and ground-based harvest are situated on already existing old landing sites located along Forest Service system roads and at the terminus of the temporary road linked to Units 5 and 7 (project file SOIL – Map Appendix, Map 6). That disturbance is accounted for in the existing condition. At this time, no new landing sites are currently proposed.

The logging slash from tree limbs, tops, and un-merchantable pieces would stay within all harvest units except Unit 7 and be allowed to remain for one wet season before being underburned or grapple piled. This would allow the foliage and branches to leach and recycle nutrients, primarily potassium, back into the soils' organic layer. Slash in two units (29 and 35) would also be lopped, scattered, and left without additional site preparation. Determination of fire risk where slash is left untreated for prolonged periods of time will be made by the district fire management officer. Where fire risk is considered high, especially near roadsides, flexibility will be given to treat slash more aggressively, which may reduce the amount of recycled nutrients in these localities.

Direct and Indirect Effects of Biomass Removal – Commercial thinning with mandatory biomass removal is proposed on approximately 290 acres in Unit 7. With respect to biomass removal in Unit 7, logging residue that exceeds the 5 to 15 tons per acre requirement of leaving 3"+ diameter material (Graham et al. 1994; Design Features - Chapter 2, Section 2.4, EA) would be removed during harvest with a small-scale harvester and forwarder. The smaller and lighter machinery should result in less compaction compared to equipment typically used for sawtimber-size trees, especially if passes are limited (Johnson et al. 2007). Removal of residue would also eliminate additional trafficking by biomass collection equipment that may increase physical impacts to the soil. For comparison, "standard-sized" harvesting equipment vary in width between 10-12 feet and weigh between 50-60,000 lbs, whereas the small-scale machines vary in width between 7-10 feet and weigh less than 26,000 lbs. A special contract provision will be developed for restricting the size and type of equipment to be used in Unit 7.

Removal of biomass that is in excess of recommended retention levels will be a contractor option on approximately 341 acres for Units 1, 2, 4a, and 5. Slash would be collected after it overwinters for a wet season to allow nutrients to recycle back into the soil. The woody material that remains on-site would primarily be high-nutrient small branches and foliage. On the average, about 25 percent of the above-ground nutrients in the pre-harvest stand would be retained following residue removal, compared to about 40 percent retained following conventional harvest (Minnesota Forest Resources Council, 2007). Existing guidelines, such as having equipment re-use trails and existing infrastructure and utilization of slash mats would also reduce adverse impacts of harvest and grapple piling operations.

Direct and Indirect Effects of Mitigation Measures - Mitigation measures, such as use of existing skid trails, slash mats, and winter logging would keep proposed harvest impacts under 15% for the units that are currently below this level. Design and mitigation measures to limit harvest impacts are described in Chapter 2.

Four activity areas which currently exceed soil quality standards (Units 1, 2, 3, and 4) would be winter logged to further prevent additional impacts. A combination of seasonal restrictions and strict adherence to making use of existing skid trail corridors and utilizing slash mats whenever possible should provide protection so that current conditions are not increased.

In addition, provision for net improvement on previously impacted activity areas would be achieved through soil restoration activities that would target detrimental disturbance in Units 1 and 2. This would be accomplished through decompaction, addition of organic material, seeding, and weed control. Anticipated results would provide for improvements in hydrologic function and would initiate a recovery process that otherwise may be prolonged as soil compaction persists. Post-harvest monitoring is scheduled to assess if mitigation objectives in these units are met.

Direct and Indirect Effects of Pre-commercial Treatments – Pre-commercial thinning is planned in Units 29 and 35 and would include 91 acres of hand-thinned fuels reduction. No mechanized equipment would enter the parcels, therefore, no disturbance from compaction, displacement, or rutting of soils would occur. The potential incidental salvage and removal of hand-thinned Christmas trees and boughs would have little impact on soil productivity since the bulk of trees within the currently overpopulated stand remains.

Direct and Indirect Effects of Prescribed Burning and Slash Pile Disposal - No measurable negative effects on soils are anticipated from post-harvest underburning if soil moisture content is equal to or above 25 percent when the burning occurs (Niehoff 1985 and 2002). On south-facing aspects (mainly portions of Units 3 and 4), the prescribed burns would have no long-term detrimental effects when executed in the spring because organic matter would be retained, continue to protect soils, and contribute to ongoing soil productivity. Burning under controlled conditions at high soil moisture also reduces potential nutrient losses and the chance of creating hydrophobic soils that can lead to increased erosion, sedimentation, and debris flows (Ice 2003; Neary et al. 2005; Robichaud 2000; Swanson 1981).

However, on an unpredictable site-specific basis, some drier areas may underburn at a severity level that removes all of the protective duff and litter layers, even under managed fire conditions. The duff and litter layer is important in protecting the soil horizons, both as reducing erosion potential and in maintaining soil moisture. Litter prevents the breakdown of soil aggregates and lessens the velocity of overland flow, thereby decreasing the erosion potential (Beschta et al. 2004).

When burn piles are large, nutrient losses from heat and volatilization could be considerable. It is recommended that burn piles be small and numerous rather than large and few. In some cases, burning of the slash piles may create localized patches of hydrophobic soils for a short period (as much as one to two years) but the areas are generally not large or extensive enough to alter slope hydrologic responses or long-term soil productivity.

Design features also require piling machinery to utilize existing trails, operate on a slash mat whenever enough material is available, and stay on slopes less than ~35 percent to prevent soil disturbance in excess of guidelines. The units would be entered from existing roads and skid trails. The residual logging debris that would be lopped and scattered or that could not be grapple piled and burned would increase potential fire intensity and severity for a few years until snow could compress the debris and the fine organics would decompose.

Direct and Indirect Effects of Temporary Road Construction and Road Reconstruction - The Proposed Action has scheduled a total of ~0.4 mile of temporary road construction associated with Units 4a and 5 to move personnel, logs, and skyline equipment to complete harvest and fuels treatments (PF Doc. SOIL-10). Construction of temporary roads would have an effect to short-term site productivity through compaction and displacement on approximately 1.9 acres (PF SOIL-10). The temporary road would be obliterated upon completion of use, thus helping the recovery of soil productivity, improving infiltration, and reducing hydrologic effects from road surface runoff (Switalski et al. 2004). No new permanent roads will be constructed.

Segments of Forest Roads #397A, #397C, #397D, #940, #940-UA, #940-UB and #941, totaling 9.9 miles, will require minor reconstruction prior to use. The maintenance work includes roadside brushing, blading, ditchline

cleaning and shaping, spot graveling, and ditch relief pipe installation and replacement. Effects to soils are usually short-term and limited to sites that are already dedicated system roads. The road work would also improve current conditions by stabilizing roadbeds and surfaces that are eroding in several locations. Refer to the Hydrology Specialist's report for additional information of road effects (EA Appendix C).

A small wet area with standing water is present at the far northeast corner of Unit 5 just past the bend near the road (PF Doc. SOIL-13). Installation of an appropriately sized ditch relief pipe (see hydrology report) is proposed to allow for this area to drain since the road fill is presently obstructing flow. Along the same stretch of the northernmost boundary of the unit, a ~50 feet long saturated cut slope is also present. Though no extensive seepage is visible in the summer, the sandy soils are partially gleyed, mottled, and very moist. This area appears to be one of the main contributors to the extensive below lying wetland complex. Recommendations include restricting logging above the immediate cut slope to no closer than a chain to retain slope integrity and hydrologic function. No other road related areas of stability concerns were observed in the project area.

Direct and Indirect Effects on Soil Productivity – The Resource Area is underlaid by glacial and alluvial material and granitic bedrock (EA Appendix A, Figure SOIL-1; PF. Doc. SOIL-9 and 17). These parent materials are not expected to be quite as potassium deficient as some Belt Series rocks, which make up less than 1 percent of the Templeman Project Area (Garrison-Johnston et al. 2004 and 2007; Moore et al. 2004a and 2004b). Nevertheless, fine residue (foliage and branches) is allowed to remain throughout the winter within each proposed harvest unit. This allows potassium and other nutrients to leach out of the fine residue and back into the soil where it would be available for future uptake (Baker et al. 1989; Barber and Van Lear 1984; Edmonds 1987; Garrison and Moore 1998; Laskowski et al. 1995; and Palviainen et al. 2004).

As a direct effect, harvesting on all sites would remove within each tree bole (and bark) about 22 percent of the potassium that is contained within a tree (Garrison-Johnston et al. 2004). This may have an indirect effect on some plants that remain in the stand. The commercial removal of Douglas-fir, grand fir, western cedar, and hemlock in association with leaving western larch would allow the release of stored foliar potassium as a beneficial nutrient for uptake by western larch (Garrison and Moore 1998). Western larch is a more potassium-efficient species (Garrison-Johnston et al. 2007) and would remain throughout those units where it already is part of the stand component. Measuring the effects of on-site productivity, however, cannot be done with certainty until more research information becomes available. At this time, management recommendations from the IFTNC are used as guidelines for maintaining sufficient potassium on a site.

Approximately 5 to 15 tons per acre of coarse woody debris for dry sites and 17 to 33 tons per acre for moist sites would be left after harvest and site-prep operations are completed. This would provide protection against soil erosion as well as a long-term source of nutrients and organic matter (Brown et al. 2003; Graham et al. 1994). The majority of harvest units currently display satisfactory coarse woody debris levels though Units 3, 4, and 4a are presently on the lower end of material (PF Doc. SOIL-1).

Indirect effects of soil nutrient loss include reduced growth and yield and increased susceptibility to pathogens, such as root disease (Garrison and Moore 1998; Garrison-Johnston 2003) and insect infestation (Garrison-Johnston 2003; Garrison-Johnston et al. 2004). Precipitation (Stark 1979) and weathering of rocks will continue to make additional nutrients available on site. Annual needle, leaf, and twig fall, forbs, and shrub mortality will continue to recycle nutrients as well.

Effects of soil wood loss include altered processes of forest regeneration and growth, favoring species requiring lower soil moisture and nutrient levels. Additional effects could also include loss of habitat for species requiring soil wood as dens or substrate for invertebrates, bacteria, and fungi, which affect food availability for small rodents and their predators.

Cumulative Effects. Past, current, proposed and potential activities (EA Appendix D) that could affect critical components of the soil resource include timber and biomass removal activities, wildfire suppression, firewood cutting and noxious weed treatments. Analyses determined that cumulative detrimental disturbances within the activity area would increase from the current estimate of 11 percent (127 acres) to 13 percent (153 acres) (EA Appendix A, Table Soil-2).

Cumulative Effects from Future Salvage **-** In the event that incidental residual tree mortality occurs after completion of the project as a result of windstorms, ice-damage, fire, insects or disease in Units 1, 2, 3, 4, 4a, 5, 6, 7 and associated roadsides used for hauling, salvage may occur. Existing skid trails and landings would be utilized or areas would be cable yarded from roadsides not requiring off-road equipment, adhering to design criteria established for this project. This activity could occur until superceded by another management decision in the affected area.

Impacts to soils are not expected to exceed past the levels analyzed in EA Appendix A, Table SOIL-2 if the design features remain identical, including seasonal restrictions, use of slash mats, and other limitations and criteria outlined in Chapter 2. The proposed post-harvest soil monitoring for this project should be reviewed before any future activities are initiated.

Section 3.3 Fire - Risk To Life And Property (Significant Issue 2)

3.3.1 Analysis Area

Fire regimes and condition classes were analyzed for the Templeman HFRA project at a larger scale than just the proposed treatment area of 1,200 acres. Scale is an important factor when looking at departure of a historic range for any particular value – because in the case of fire – disturbance doesn't occur at the same time on all stands and at the same intensity when it does occur, there is natural variation (Interagency Fire Regime Condition Class Guidebook). For example, dry-sites dominated by ponderosa pine may have an average low-intensity fire return interval of 20-40 years historically. However, this is an average of all the dry site forest across a landscape. Some portions may have just experienced a fire – where only a small portion burned with severe effects and the remainder did not – and other stands may have not experienced a fire for several decades.

The analysis area for determining the direct, indirect and cumulative effects of past fire disturbances and fuel loading trends for the Templeman HFRA Project, incorporating the concepts of Fire Regime Condition Class (FRCC), was determined at a scale of approximately 7,600 acres, most of which is within the Meadow Creek watershed (6th code HUC). A more thorough explanation of the process and assumptions that went into the FRCC analysis is available in the project file.

Measurement Indicators:

- Expected fire behavior
- Suppression capabilities

3.3.2 Affected Environment

The current condition of the factors that affect fire behavior, specifically the fuels; as well as the fire regime condition class and current fire suppression capabilities for the Templeman analysis area are described below. See the fuels report in EA Appendix B for full details, which includes discussions on assumptions, strengths and weaknesses of using certain fuel models.

3.3.3 Fuel Characteristics: fuel loading, canopy characteristics, species composition, structure, continuity, etc.

Due to slope, aspect, and associated terrain and vegetation, it is possible that several different fuel models were present historically in the project area – representing three of the main fuel model groups where grass, shrubs and brush, or timber litter would have been the main carriers of a surface fire.

Moist and dry habitat groups are represented in the project area. Although they differ in species composition, where previously untreated they have the same basic structure and fuel composition – abundant ladder fuels and surface fuels and the potential for extreme fire behavior.

Dry Habitat Groups

Approximately 50% of the project area is considered dry forest habitat. Units 3, 4, and 4a are dominated by dry site vegetation on south and southwest facing aspects where frequent surface fires (approximately 40 year return interval) historically kept surface fuels under control (Arno and Fiedler 2005). Surface fuels would have likely consisted of grasses and brush under open-grown ponderosa pine and larch. Although grass fuel models can have high rates of spread, there is generally no post-flaming combustion, thus little severity to soil, water, or wildlife resources. Fuel model 5 exists where some previous harvest activities have occurred – these areas can have high rates of spread and flame lengths depending on the availability of the fuels to burn (moisture content), which would be greater during high fire danger. Abundant tall brush, or ladder fuels, increases the fire hazard because it limits the space between the surface fuels and the aerial fuels (tree crowns). As time passes between fires (or fuels management), dead timber litter accumulates and contributes to carry a wildfire. Under this condition, fuel models change, becoming a fuel model 8 (timber with light timber litter), fuel model 9 (compacted pine needle litter) or a fuel model 10 (timber with heavy surface fuels).

Currently, there are patches of fuel models 2, 5, 8, and 10 – the amount of dead and dying and ladder fuels contributing to a fuel model 10 (described below). Oceanspray, ninebark, maple, and other shrub and herbaceous vegetation common to south and west aspects dominate the understory fuels, with thick patches of Douglas-fir reproducing successfully in areas. All of these surface fuels (see Table 6 below for averages of fine fuels) are competing with the overstory vegetation for nutrients and available water. Deep duff is accumulating (due to missed fire cycles in can be 4 times greater than historic levels) (Smith and Fischer 1997) and will contribute to burn severity by holding heat in the ground.

Moist Habitat Groups

The project area is comprised of approximately 50% moist sites that are situated on north to northeast aspects and flat slopes and are dominated by fire-intolerant species. Cedar and hemlock are dense, and dead and dying trees, as well as low-growing crowns have created abundant ladder fuels. Fuel loadings and coarse woody debris are highest on these sites, thus hot-dry conditions create a fire hazard due to low fuel moistures in heavy fuels.

Currently, **the untreated moist habitat types in the project area are a fuel model 10**, or timber with heavy surface fuels (this determination was made with data and associated photographs gathered through numerous site visits – field notes in project file). This fuel model exhibits more intense and severe surface fire behavior than does the other timber litter models under high fire danger conditions (Anderson 1982). A dense forest canopy, heavy timber litter, and suppressed regeneration could contribute to a surface fire with high mortality and high severity. Under periods of high fire danger, extreme fire behavior such as torching, crowning, and spotting would likely be observed with the current fuels situation. Due to the continuity of these fuels, this type of fire behavior not only poses a threat to the public, but to fire fighting resources as well. See project file for photographic examples of the described fuel models.

Fuel Model 10

Figure 2 - Fuels 1 **(Dry site on left) and Figure 3 -** Fuels 2 **(Moist site on right). Examples of fuel model 10 – photos taken in the project area.**

Fuel Loading: Coarse-woody debris and 1, 10,100 hour fuels by forest type

Coarse-woody debris (dead standing and downed pieces greater than 3" in diameter) is an important component of a healthy ecosystem. Animal life processes, site productivity and protection, as well as fire, are important components most commonly discussed by forest managers (Brown, Reinhardt, Kramer 2003). Observations of past fire behavior shows that small woody material, less than 3" in diameter, has the most substantial influence on fire behavior (such as spread rates and fire intensity), and can be estimated using broadly accepted fire behavior models (Brown, Reinhardt, Kramer 2003). However, large woody fuels can contribute to large fire development and high fire severity. The greater the fuel loading of this large material, coupled with the size and decay rate, can greatly influence fire severity (effects to soil, water, other forest resources) – this is generally due to smoldering and persistent burn periods (Brown, Reinhardt, Kramer 2003).

Table 5 - Coarse Woody Debris>3" diameter material

Forest Type	Ave.	Recommended
Dry	10.8	6.6 – 13.2
Moist	27.8	16.5 – 33.0

Coarse Woody Debris calculated in tons/acre

For the dry sites decay rates for dead, down woody material are generally lower than they would be on moister sites, especially in the absence of fire (Brown, Reinhardt, Kramer 2003). Although the amount of CWD throughout the project area varies quite considerably (field notes available in the project file), the **average is 10.8 tons/acre for the dry habitat groups and 27.8 tons/acre for the moist habitat groups** (units 5 and 6 having the greatest amounts – some areas with loads greater than 50 tons/acre). Recommendations by Graham et al. (1994) for these sites are 6.6-13.2 tons/acre and 16.5-33.0 tons/acre respectively (Table 5). Although CWD falls within the recommended range for each habitat type, these recommendations are for desirable biological benefits – but there must be a balance as to not create an unacceptable fire hazard (Brown, Reinhardt, Kramer 2003). Crowning out, spotting, and torching are greater where heavy CWD has built-up in a forested environment (Brown, Reinhardt, Kramer 2003).

Fine fuels are continuous throughout, in the form of twigs, small branches, live and dead brush and grasses, and pine needles. As mentioned, these fine materials will contribute to the overall fire spread, especially on the drier sites where the forest floor is littered with ponderosa pine needles and the dominate surface vegetation is pine grass and brush.

Small fuel loads can be summarized by fuel model – the majority of the current untreated portions of the project area can be classified as fuel model 10 (Anderson 1982). FVS is also a reliable tool for summarizing fuel loads, as it models data collected from stand exams. Table 6 summarizes the average load of small diameter fuels for a typical untreated, dense stand in the project area from FVS.

Table 6 - Summary loading of small dead fuels in tons/acre for typical untreated stand in project area

Smaller Surface Fuels (<3" diameter - dead)	(Tons/acre)
1 hr (0-.25")	2.0
10 hr (.25-1.0")	1.3
100 hr (1.0-3.0")	3.25
Total Surface Fuel (<3 inch)	6.5
Duff	34.6

Canopy Base Heights

Canopy base height (CBH) is the lowest height above the ground where there is a sufficient amount of canopy fuel to transition a fire from the surface fuels into the tree crowns. Therefore, low canopy base heights are a critical factor in determining crown fire potential. Fuels treatments should focus on removing some or all of the ladder fuels and other vegetation that contributes to a low canopy base height, especially where reducing crown fire initiation is a priority. Canopy base heights were determined across the project area from on-site observations, and on **moist sites** they **are as low as 1 foot** (see Table 7 below and field data section in project file**).** The structure and species composition of the stands – specifically cedar and hemlock with low growing crowns, as well as dense understory trees – are contributing to the low canopy base heights observed. **Drier sites** in the project area tend to have greater variation in stand structure, but canopy base heights are still low due to the tall shrubs and understory trees and **average 3 feet** for fire behavior predictions (see field data section in project file**).** The fuels continuity from the surface fuels to the crown fuels has created the potential for surface fire to propagate to the crowns of the overstory trees.

Canopy Bulk Density

Canopy bulk density (CBD) is the mass of available fuel per unit of canopy volume (kg/m3). It is a bulk property of a stand, not an individual tree. Canopy bulk densities were assumed from estimates in FFE-FVS for representative stands within the project area. It is a difficult canopy characteristic to measure directly (short of cutting down the trees); FVS uses a technique to estimate "effective" CBD in nonuniform stands from a stand inventory that does not assume a uniform vertical distribution of canopy fuel – uniform measurement can be estimated by dividing canopy depth into canopy load (Scott and Reinhardt 2001).

Canopy Base Heights (CBH)

The lowest height above the ground in feet at which there is a sufficient amount of **canopy fuel** to propagate fire vertically into the canopy. It is an effective value that incorportates ladder fuels such as the shrubs and understory trees.

Canopy Bulk Density (CBD)

The mass of **available canopy fuel** per unit canopy volume. It is a bulk property of a stand, not an individual tree. Measured in kilograms per meter cubed – kg/m^3.

Scott and Reinhardt (2001) describe the criteria necessary for active crown fire: Mass-flow rate is defined by Van Wagner (1977) as the rate of fuel consumption through a vertical plane within the fuel bed and it is a product of CBD and spread rate. CBD affects the critical spread rate needed to sustain active crown fire. If the mass-flow rate falls below a certain threshold, active crowning is not possible. Therefore, the lower the canopy bulk density, the lower the potential for active crown fire. This increases the **crowning index – or windspeed at which active crown fire is possible** – so it would take greater winds to sustain active crown fire once the canopy bulk density is decreased in a stand. The current canopy bulk density is displayed in Table 7 below. It is assumed that treatments that remove overstory trees will also effectively lower the CBD – for example, if 50% of the canopy is removed, then it is assumed the canopy bulk density is decreased by 50% on average. However, this relationship can vary quite a bit depending on species removal, as some species obviously have much more mass in the canopy than others.

Table 7 -Current CBH and CBD in the project area

Canopy Base Height (feet)
1 - 3
Canopy Bulk Density (kg/m^3)
0.1 - 0.2

3.3.4 Fire History

Fire is an essential form of disturbance in all western forests. Vegetative structure, function, and processes depend on it. Several conifer species are dependent on fire for regeneration – including ponderosa pine, western larch, western white pine, and lodgepole pine. Dry, moist, and even high elevation forest succession is dependant on fire frequency, fire severity, and fire scale. There are three types of fires that occur in forested ecosystems (Zack and Morgan 1994):

- *Lethal fires* – fires that are stand replacing, removing 90%+ of the live tree dominant upper canopy layer across >90% of the stand across a large, relatively uniform scale. These are commonly crown fires that burn with high severity. Local examples of these types of fires are the Sundance and Trapper Peak fires of 1967 that together burned over 80,000 acres in a short time period during drought conditions
- *Non-lethal fires* **–** fires that kill 10% or less of the dominant tree canopy. A much larger percentage of small understory trees, shrubs, and forbs may be burned back to the ground line.
- *Mixed severity fires* - fires that commonly burn with variable severity across the landscape, producing irregular, patch mosaics; killing more than 10%, but less than 90% of the dominant overstory tree canopy. Fire regimes are considered variable – a short return interval non-lethal fire may occur with occasional long interval lethal crown fires.

In the Western United States, millions of acres of forests have accumulations of fuels that are much greater than historical conditions – due to various forms of fire exclusion (Peterson et al. 2005). The fuel build-up has led to an increase in catastrophic wildland fire risk (Pollet and Omi 2002). The Myrtle Creek Fire in 2003 is a good example of a fire burning in heavy, abundant, and generally continuous fuels (Fire Behavior and Weather Report – Myrtle Creek Fire 2003). Another local example is the 1967 Sundance Fire which started on September 1st and grew from 4,000 acres to nearly 56,000 acres in 12 hours, burning across the entire Pack River Drainage and other areas of the Selkirk Mountains just missing Bonners Ferry. During the period of the fastest spread, the fire burned at a rate of a square mile (640 acres) every 6 minutes and produced a column of smoke that rose 35,000 feet into the air.

Wildfires are becoming more intense and severe, specifically in areas that did not historically experience landscape scale stand replacing fire, such as dry-site ponderosa pine stands in the western United States (Arno and Fiedler 2005, p. 36). Because of the existing conditions as previously described, there is the potential for wildfires to exhibit a high resistance-to-control – the more intense and severe the fire, the greater the number and type of resources needed to suppress it. These forests generally have vegetative conditions that seem to be fitting for crown fire behavior – low growing crowns and other ladder fuels, dense canopies, large amounts of heavy timber litter, etc.

Large fire events have occurred in the vicinity of the analysis area throughout history –as recent as 1979, when approximately 400 acres burned near Templeman Lake. However, other than that fire, the local fire atlas shows very little recorded fire history within the project area boundary. Therefore, it is likely that the role of fire has been removed to some degree by fire suppression – especially in the drier forest types.

The Templeman Lake fire burned intensely with rapid rates of spread. Prior to the fire, district fire personnel remember the stands being similar in structure to the dense untreated stands in the area today – high surface, ladder, and crown fuels. Some locals who remember the fire as firefighters had to stand back and watch and believe that if it

wasn't for the fire burning into previously treated and thinned stands, the fire would have continued burning north at a rapid and uncontrollable rate of spread (Scott Bacon, Idaho Department of Lands, personal communications). The previously thinned stands slowed the fire to a point where fire crews could safely attack it and it was contained. The majority of the fire growth of the 400 acre fire occurred in one afternoon – the observed behavior of the fire was extreme – torching, crown fire with running crown fire, and spotting ahead of the fire all occurred. Twenty-eight years have passed since this fire – twenty-eight more years of fuel accumulation in the untreated adjacent stands. Empirical evidence suggests it would not be unrealistic to expect fire behavior of a similar or even more severe degree in adjacent stands to what was observed for the Templeman Lake fire in the summer of 1979.

The forest types in the Templeman HFRA analysis area have varied fire regimes; the drier sites experienced generally short cycles of low-intensity or non-lethal fires, and occasional stand replacing fires may have occurred as well. Moist cedar-hemlock forest types experienced longer interval mixed and high-severity, lethal fires; however low-intensity fires would have played a role in these forest types as well (Smith and Fischer 1997) (Franklin et al 2006).

3.3.5 Fire Regime Condition Class

Fire Regime Condition Class (FRCC) is a qualitative measure describing the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuel loadings. Departure can be caused by any number of sources such as introduced exotic species, introduced insects or disease and management activities. Depending on forest type, it can be an indicator for fuel reduction needs and can help prioritize treatments to improve overall landscape condition class (Hann and Strohm 2003).

Although this project is defined as being within the wildland-urban interface, the Healthy Forests Restoration Act also calls for expedited fuels treatments in areas classified as Condition Class 2, Fire Regimes I, II, or III and Condition Class 3, all Fire Regimes.

Fire Regime Definitions:

I 0-35 years and low to mixed severity
II 0-35 year frequency and high severity
III 35-100+ year frequency and mixed severity
IV 35-100+ year frequency and high severity
V 200+ year frequency and high severity

Fire regimes and condition classes were analyzed for the Templeman project area at a larger scale than just the proposed treatment area of 1,200 acres. Scale is an important factor when looking at departure of a historic range for any particular value – because in the case of fire – disturbance doesn't occur at the same time on all stands and at the same intensity when it does occur, there is natural variation (Interagency Fire Regime Condition Class Guidebook). For example, dry-sites dominated by ponderosa pine may have an average low-intensity fire return interval of 20-40 years historically. However, this is an average of all the dry site forest across a landscape. Some portions may have just experienced a fire – where only a small portion burned with severe effects and the remainder did not – and other stands may have not experienced a fire for several decades.

FRCC was determined at a scale of approximately 7,600 acres (Figure 4 and Table 9), most of which is within the Meadow Creek watershed (6th code HUC). Although roughly 50% of the proposed treatment area is dry-site and 50% is moist site, nearly 75% of the larger FRCC landscape is moist site. Fire regimes were determined using habitat groups as the basic level of stratification – there were four strata – dry, moist, cool/moist, and cold/dry forests. Within each there is a reference (historic) value for fire frequency, fire severity, and vegetative structure (early seral, mid-seral closed, mid-seral open, late seral open, late seral closed) and the three together make up the weighted strata condition class. The weighted sum of the strata departure then makes up the overall landscape level FRCC rating. A more thorough explanation of the process and assumptions that went into the FRCC analysis is available in the project file.

Data gathered in the field and knowledge of current frequency of fire and expected fire severity has led to the determination that the FRCC at the project level is moderately altered (condition class 2, see Table 8 definitions) from the natural range across the Templeman area. The main contributors to this rating are fire exclusion, the reduction in white pine due to blister rust which has affected stand structure and species composition, and past

timber harvest. Other than the area that burned in 1979 and very small portions that burned in 1889 and 1921, it was assumed for the FRCC analysis that fire has been excluded from the remainder of the project area for at least 120 years (no records before 1889). As mentioned, this has affected the dry sites where at least two fire cycles have been missed and long-lived seral species such as ponderosa pine are the ecosystem components at moderate risk of being lost due to fire regime condition class departure.

Table 8 - Definitions of Condition Classes

Condition Class	
1 (0-33% Departure)	Fire regimes are within natural range, and risk of losing key ecosystem components is low. Vegetation attributes are intact and functioning within historic range.
2 (34-66% Departure)	Fire regimes and vegetation attributes have been moderately altered from natural range. The risk of losing key ecosystem components is moderate. Fire frequencies have been departed by one or more intervals.
3 (67-100% Departure)	Fire regimes and vegetation attributes have been significantly altered from their natural range. The risk of losing key ecosystem components is high. Fire frequencies are departed by several return intervals.

Figure 4 - Current FRCC percent departure from natural range

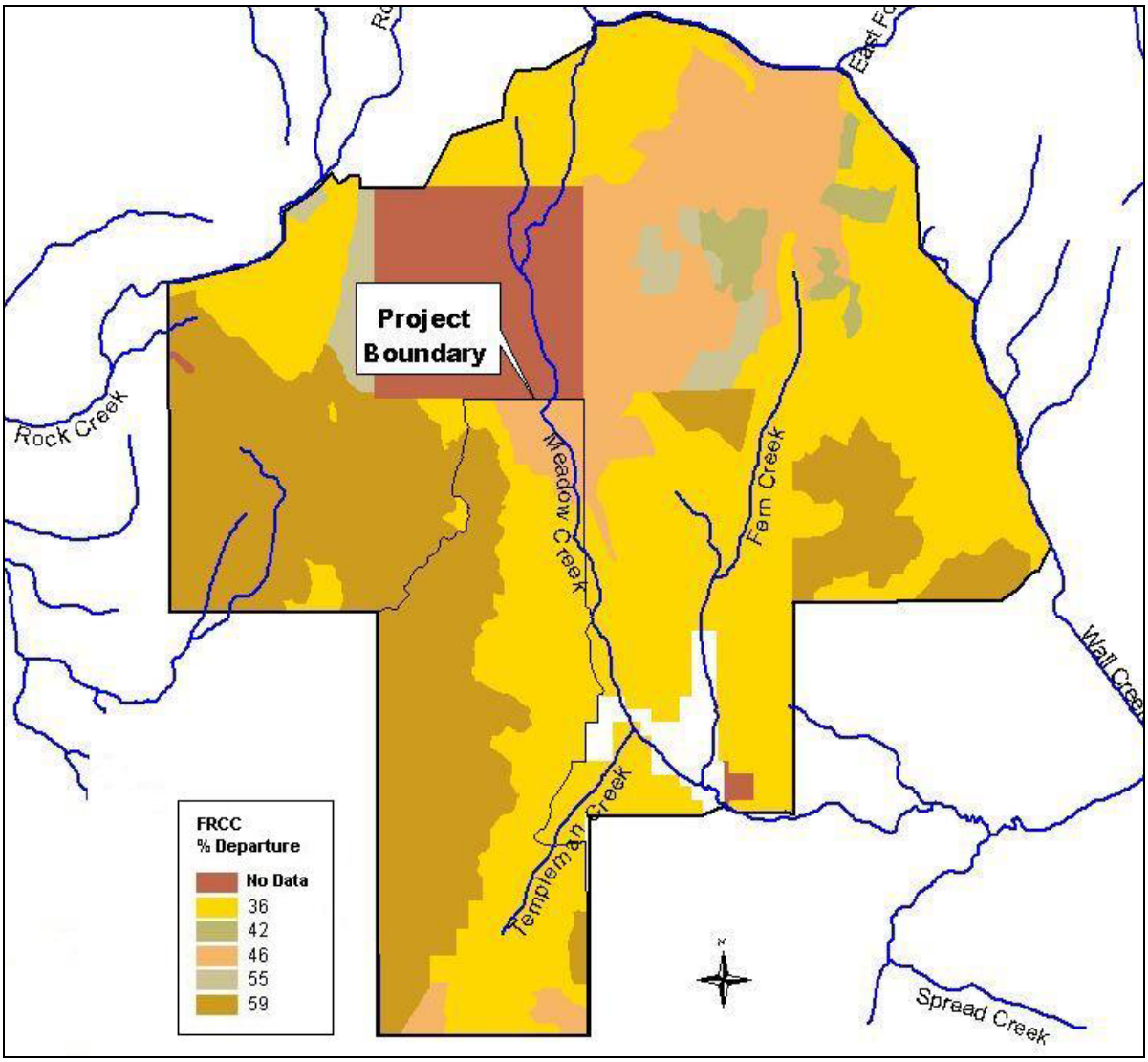


Table 9 - FRCC departure by major forest type represented

	Fire Regime*	Condition Class
Moist	III-V	2
Dry	I	2
Landscape Departure (Weighted) Condition Class 2 – 40%		

*The Fire Regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning – thus, it is a constant measure for a particular vegetation group and does not change regardless of condition class.

3.3.6 Fire Behavior

The following section summarized the expected fire behavior based on the current condition of the fuels modeled under fire danger scenarios typical of hot and dry North Idaho fire season. We model it this way because that is the time when fires pose the greatest threats to firefighters and the public and have the greatest potential for spread and extreme fire behavior – it allows the best opportunity to compare the effectiveness of fuels reduction activities.

Surface Fire Behavior

Under the existing fuel conditions, surface fires in the event of a summer wildfire would exhibit behavior that would limit direct attack to ground machinery and aerial resources only. Expected flame lengths would be greater than the limit that can be safely attacked by handcrews – **predicted flame lengths would be greater than 5 feet and the limit for safe direct attack by firefighters is 4 feet**. Longer flame lengths generally mean greater rates of spread, especially if the fire moves into the tree crowns. Fast moving fires are generally more difficult to control, and in the wildland urban interface, create an even greater concern as fires may threaten homes and other structures as well as escape times out egress routes.

Similar results would occur in the dry forest types, as fuel structures are generally similar. Although overall fuel loading is generally less in these stands, they are more open to the elements such as solar radiation and drying of fuels due to the generally west to south aspects.

Crown Fire Potential

3 Key Fuels Factors for Crown Fires

- How much surface fuels?
- How close are the trees crowns to the ground?
- How dense are the tree crowns?

Crown fire potential is generally based on the amount of surface fuels, the amount of ladder fuels – which serve as the avenue to move surface fire into the tree crowns, and the density and spacing of the overstory. Heavy surface fuels generally contribute to longer flame lengths. As mentioned above, if canopy base heights are low, those surface flames can then carry into the tree crowns. Once there, a crown fire may persist if the structure of the canopy is such to support crown fire. The more spaced the canopy, the greater the wind necessary to move fire from one crown to the next. Dense canopies would obviously require much less windspeed to support crown fire.

The condition of the project area is such that a crown fire could be supported due to the current surface, ladder, and crown fuels. The predicted flame lengths coupled with the low canopy base heights of 1-3 feet would equate to a **high probability of torching of the canopy (>90%)**, thus **potential mortality to the overstory trees would be between 60-100%** (see FFE-FVS model outputs in the project file).

Plantations

The fire behavior in the existing moist plantations within the project area would be much different than would be expected in the mature untreated forests. The regeneration is relatively uniform in size and structure. Fire behavior would be similar to that of a fuel model 8 (desired condition fuel model), as much of the surface fuels were removed in the previous entry. **Surface flame lengths would average <2 feet** (see FFE-FVS model outputs in the project file).

The canopy structure of the smaller trees in this forest type is such that crowns are developed down to the surface fuels and much of the regeneration is on a 5-10' spacing, surface fire with torching would be the expected fire type. The plantation is a mix of conifer species – mostly lodgepole, western larch, western white pine and Douglas-fir, but also species generally referred to as late seral like western redcedar and hemlock (Figure 5).

Figure 5 - Templeman Lake Fire Plantation

The plantation created from the Templeman Lake fire in 1979 (proposed unit 7) – now a mix of immature conifer – would exhibit somewhat different fire behavior than the moist plantations. It is currently dominated by ponderosa pine and lodgepole in patches, as well as larch, lodgepole and Douglas-fir in others. The average size is less than 7"; therefore, these trees are not merchantable as saw logs. The stocking is dense – at a spacing of approximately 5 feet. The trees have a high crown ratio – the crowns extend the length of the boles for the most part, thus canopy base heights are very low – approximately 1 foot. Whereas the moister plantations have a rich layer of live surface fuels - the surface fuels in this stand vary – much of the area is covered in dead pine needles and pine grasses, and very little brush or coarse-woody debris.

Fire behavior would vary throughout, as is described in the fuels above. Individual and group torching would occur more frequently in these stands and surface fire behavior would be more intense with **approximately 3 foot flame lengths** – coupled with canopy base heights generally less than a foot, a torching situation would be likely in the untreated plantation. The probability of mortality is between 35-95% (see FFE-FVS model outputs in the project file).

Environmental Consequences - Effects of the Alternatives

Three indicators of fire hazard were used to evaluate the changes in fire behavior by alternative. First, **potential flame length** was used to determine surface fire potential and the trends of surface flame lengths over time as a measure of treatment effectiveness over time. Potential flame lengths are outputs of FFE-FVS. Suppression tactics are directly related to flame lengths, as fires with flame lengths less than 4 feet can be attacked using hand crews to construct fire line. Flame lengths greater than 4 feet would require other resources, such as dozers or other mechanical equipment or aircraft carrying water or retardant (NFES 2165, NWCG 2006 p. B-59)

The second indicator for fire hazard in the analysis is the **probability of torching**. A torching situation is generally defined as one where tree crowns of larger trees are ignited by surface fire flames or flames from smaller burning trees reaching the larger trees. Canopy base heights are a critical factor for determining the potential for torching. The torching index is calculated by conditions of surface fuels, fuel moisture, and windspeed. Torching is sensitive to surface flame length, understory development and ladder fuels, and crown structure. Management actions that modify these processes will change the predicted value of the torching index and the probability of torching with a forested stand. Because FVS models growth and development of a stand into the future, as well as modification of stand characteristics through management actions, and the Fire and Fuels Extension models changes in fuel structures and potential fire behavior – FVS-FFE was used to determine a potential torching index of the alternatives. As it is a measure for large trees, it was not used in the analysis of the effects of the alternatives on the plantations.

The third indicator of fire hazard is the **crowning index** which is the wind speed, 20 feet above the canopy at which crowning is possible (Duveneck and Patterson III 2007). As with the torching index, this measure is also an output of FFE-FVS. This index reflects the density of the canopy fuels. It is an important measure for evaluating the effectiveness of fuels treatments because crown fires generally exhibit rapid rates of spread, cannot be attacked directly due to fire intensity and they consume the crowns of trees, they result in nearly complete mortality of the overstory. This type of fire behavior may be acceptable outside of the wildland urban interface or in wilderness or back country situations. However, due to the resistance-to-control, unpredictability, resource damage, and especially the danger that crown fires pose to firefighters and the public, crown fires are unwanted in the urban interface and boundary of an at-risk community where people reside.

The crowning index is the point at which active crowning – a solid wall of flame extending from the fuel bed surface through the top of the canopy (Scott and Reinhardt 2001) – is possible, not necessarily the point at which it can be initiated. Passive crown fire usually happens first, where individual or small groups of trees torch out.

All indicators listed above need to be considered in conjunction with one another. For example, over time surface fuels will accumulate at the greatest rates, and therefore predicted surface flame lengths may steadily increase. However, if ladder fuels are not present and the canopy fuels are spaced, the potential for torching and active crown fire may remain low. The table below summarizes the effects by alternative on the indicators of fire behavior.

Fire Behavior Indicators:

- Flame Length
- Probability of Torching
- Crowning Index

A. Effects Common to Both Alternatives

Fuel Accumulation

Regardless of the alternative chosen, fuel build-up will continue indefinitely in the Templeman HFRA project area as stands go through succession. An action alternative would reduce fuels in the near-term and an assessment for future entries would be needed as fuel treatment benefits are known to lapse due to surface fuels accumulation and other stand changes (Agee 2002). Obviously forest type and other environmental and human factors will affect the rate at which that occurs. Not all areas will need mechanical re-treatment – some areas may only need a subsequent prescribed underburn to maintain fuels. At any rate, the no action alternative will not address the current fuels hazard and the affected area would be at an elevated potential of a large, uncontrollable (unwanted) wildfire due to increased fire intensity associated with higher fuel loads, which would hamper fire suppression efforts. One of the main objectives for the Templeman HFRA project is to protect resources in the wildland urban interface from the effects of intense wildfire behavior.

Probability of Ignition

Probability of ignition is strongly related to fine fuel moisture, air temperature, shading of surface fuels, and an ignition source (Graham, McCaffrey, Jain, 2004). Implementation of the treatment alternative will not affect the

likelihood of lightning strikes; however the risk of human caused fires may increase to some degree depending on how completion of the chosen alternative affects public access and use in the area. Regardless of the alternative chosen, ignitions would still be expected across the proposed action area. Altered stand structure can affect stand temperature and humidity – there is generally a warmer and dryer microclimate in more open stands (Graham, McCaffrey, Jane 2004). Dense stands, such as those with no record of past management or fire, generally have more shading of the surface fuels and higher relative humidity and air temperature (thus, higher surface fuel moistures) (Graham, McCaffrey, Jane 2004). An open forest structure would have contributed to the maintenance of ponderosa pine and other fire-dependent forests – where fire starts may have been common due to an increased probability of ignition, but intensities and severities were generally lower due to maintained surface fuels. The proposed action would aim to mimic these surface fuel conditions. Even with a fire start in areas treated under the proposed action, fire spread would be expected to decrease due to projected slower rates of spread and lower flame lengths. In the case there is an ignition and resulting wildfire, spotting that accompanies crown fire will be reduced because of modified surface, ladder, and canopy fuels.

Lightning is the main cause of fire occurrence on National Forest System lands on the Bonners Ferry Ranger District - nearly 80% of all fires are ignited this way (see project file). When considering the probability of fire, it is better to consider the probability of burning, because that includes fires moving from elsewhere into this particular area. The district fire organization takes suppression action on approximately 21 fires every fire season (averaged since 1941). On average, 1 fire is reported in the Camp Nine area every year. Large stand replacing fire events occurred in 1889, 1921, 1922, 1926 and 1979. Between 1889 and 1926 a large fire occurrence occurred on average of every 9 years. Successful fire suppression began shortly after the 1926 fire, thus fires were kept under control until 1979 when that one escaped initial attack. The large gap in fire between 1926 and 1979 can probably be attributed to the success of fire suppression. However, if we include the 1979 fire, stand-replacing fire occurrence would be expected on average of 22 years in proximity to the project area – we are now 6 years past that average. This type of assessment is much different than if we analyzed the probability of any one particular acre of the project area burning – a number that is rather small and often used to argue that risk doesn't justify fuels treatment. Although a percent probability of fire occurring was not determined – Dr. Mark Finney (Research Forester at the Rocky Mountain Research Station) summarizes the idea of probability as follows:

> The summation of probabilities must be taken over time – many decades in fact. Probabilities may exceed 100% for a large fire somewhere in the project area if the summation is performed over a few 1000's of acres and one or two decades.
>
> He states there are problems with conclusions based only on the probability of an event. Fire occurrence is the frequency of fires within a specific area and period of time, and implies nothing about the fire size or probability of burning at a given geographic location (Finney 2005). The probability of ignition is not the same as the probability of burning. The probability of ignition is lower, yet National Forests still require funding for suppression forces. They fight fire because the consequences of having free-burning fires are felt well beyond the immediate ignition location and for reasons that are unrelated to the probability per acre.

The probability of a fire occurring in the project area may not be high, especially due to its relatively small size. Regardless, some may feel any chance of fires occurring in the project area with the current fire hazard and the predicted fire behavior is a risk not worth taking for public safety reasons.

Access for Suppression Resources

Success in initial attack relies heavily on arrival time to a fire. Well maintained roads allow for safer travel and allow for a variety of resources to support a fire, including the larger Type 4 engines (750 gallons of water) used on the Bonners Ferry Ranger District. Although road maintenance will be necessary to accomplish treatments, no new permanent roads are proposed for this project, thus access routes for suppression resources will not change. However, an open canopy and reduced surface and ladder fuels allow for quicker and safer foot travel to and from wildfires not accessible from an engine or other vehicle.

Influence of Topography and Weather on Fire Behavior

There are two contributing factors to wildfire behavior that cannot be controlled regardless of the action taken or alternative chosen for this project – the topography (elevation, aspect, parent material, etc.) of the project area and the daily and seasonal weather contributing to fire danger. However, modification of fuels and opening of a stand can affect microclimate, especially wind and solar radiation, influencing surface fuel moistures.

The Templeman project area is oriented with the prevailing wind direction - typical winds are light to moderate from the southwest. This orientation to the wind may aid in fire spread and general fire movement is to the northeast. Strong winds are generally associated with cold fronts, which can have an effect on fire behavior due to shifts in wind direction and downdrafts. More open stands created with fuels treatments would generally have greater surface winds than adjacent dense stands, affecting rates of spread and fire intensities based on that factor alone. However, properly executed fuels treatments that reduce fuels and reduce crown fire potential makes the increased wind a reasonable trade-off (Scott and Reinhardt 2001).

Slopes in the proposed treatment area are gentle to moderate, although a small portion is steep enough that it would require skyline harvesting (unit 4a). However, the majority of the project area has slopes less than 35%. Slope is a large contributor to spread of a fire – without wind, the greatest fire spread in uniform fuels will be in the direction of maximum slope. The slopes and aspects in the project area will contribute to the general northeast fire spread for this landscape.

B. Direct and Indirect Effects

Fire Regime Condition Class

Fire Appendix A, which is attached at the end of the fuels report (EA Appendix B), displays how the FRCC (condition class) would change from the current condition (as shown in Figures 2 and 3 above) after implementation of the proposed action. Table 10 below summarizes the effects of both alternatives on the FRCC departure. The No Action alternative would be the same as the current condition. A contributor to the improvement overall and on dry-sites for the proposed action is due to the use of prescribed fire on a portion of the landscape where the frequency is departed from what would have been historically (Zack and Morgan 1994). It is important to note that the purpose and need for this project is to reduce fuels in the wildland urban interface – an improvement trend in FRCC with the proposed action is an additional benefit, but not the objective of this project.

Table 10 - Fire Regime Condition Class departure by forest type within the project area.

	No Action		Proposed Action	
	Fire Regime*	Condition Class Departure	Fire Regime	Condition Class Departure
Moist	III-V	40% (FRCC 2)	III-V	39% (FRCC 2)
Dry	I	59% (FRCC 2)	I	50% (FRCC 2)
Landscape Departure (Weighted Average) 40% (FRCC 2)			Landscape Departure (Weighted Average) 37% (FRCC 2)	

FRCC 2 means moderate departure (34-66%) from natural range; both alternatives are within the range for FRCC 2. Scale of the treatment area in relation to the landscape area in which FRCC is evaluated will impact the expected improvement from implementing treatment. Approx. 1,200 acres of the 7,600 acre FRCC landscape will be treated (<16%)

Suppression Capabilities – Flame Lengths

The proposed action will effectively modify the fuels characteristics of the treated area to be consistent with that of a fuel model 8 (light timber litter – see Figures 6 & 7 below) rather than a fuel model 10 (heavy timber litter) such as the current condition where previously untreated. In some areas that are currently represented by patchy surface fuel

models (portions of the dry sites as described previously); effective reduction in expected surface flame lengths will best be achieved by underburning. Fire behavior will also be modified such as shown in Table 11 below and the following text.

Table 11 - Suppression capabilities based on expected surface flame lengths by forest type and Alternative.

	Surface Flame Lengths (Feet)			
	No Action	**Direct Attack?***	**Proposed Action**	**Direct Attack?**
Moist	5.5	No	1.7	Yes
Dry	4.0	No*	1.4	Yes
Plantations	2.5	Yes	1.2	Yes

*4.0 feet is the limit of safe direct attack by hand crews – for the current condition of the dry-sites, the average expected surface flame lengths are at the limit, the dense moist sites are above it. In addition, this is an average produced by a model – some areas may exhibit surface fire intensities lower or higher than this as it is unlikely that any of these flame length predictions would be consistent during a fire. The currently low canopy base heights could propagate the surface flame lengths into the crowns of trees, thus overall flame lengths could be much higher (20-50 feet) with torching/crowning. The same would be true for the plantations due to the low canopy base heights. Direct attack by any means would not be possible under a crowning/torching scenario.

Precommercial thinning and the Biomass Utilization (Unit 7) activities would generally focus on leaving seral species such as ponderosa pine, white pine and larch – larch regeneration being particularly fire resistant. Removing some of the more fire intolerant species will reduce fire severity to these stands if they do burn in a wildfire. The material that is cut in the precommercial thin units will be scattered – very little of it would contribute to coarse-woody debris due to the small diameter. Scattering the material will break up continuity of the activity fuels and this type of treatment will reduce the vertical fuel arrangement (space the crowns), thus reducing the potential for multiple tree torching, reducing the overall expected flame lengths throughout the stand.

Most of the material cut in Unit 7 will be utilized with just the fine branches and tops of the trees being left for nutrient cycling, which would increase surface fuels in the short term. Larger chunks of coarse-woody debris will be left on site for long-term soil productivity – this material will contribute less to fire spread and intensity as will the smaller fuels (Brown, Reinhardt, Kramer 2003). Where concentrations of this slash material exists, there would be options to pile this material with a small excavator. After treatment the fuel model would be a more consistent fuel model 8 as concentrations of fuels would be removed and the remaining small woody material would be a more compacted fuel bed that what exists now, and would be the main carrier of a surface fire over continuous dead pine needles. Spacing the tree canopies will also reduce the amount of needle litter being added to the surface fuels annually.

a. Effectiveness depending on type of post-harvest treatment (i.e. piling or underburning)

The effectiveness of treatment in reducing fuels and altering fire behavior is dependant on the type and intensity of treatment. Fuels reduction activities that include the use of prescribed fire are generally the most successful in reducing fuels (Graham et al. 1999). Depending on the site and conditions at time of burn (not <25% soil moistures), prescribed fire consumes branchwood, duff and other dead material on the forest floor, as well as brush and other herbaceous material which contributes to fire intensity and severity. Prescribed underburning will be the most useful tool on the drier sites where the stands are already a bit more open and the understory vegetation has become most established – prescribed fire will be effective at reducing the surface fire intensities of a wildfire.

Harvest alone only treats the ladder and canopy fuels and does little to address the surface fuels. Slashing, combined with biomass utilization or grapple-piling and pile burning are also effective methods of treating surface fuels, both natural and activity created – however it is not as affective in reducing the fine fuel loading (the smallest branchwood material) as is prescribed fire. This project proposes to use prescribed underburning on 450 acres and pile burning on 320 acres to address surface fuels after harvest of the overstory. Figures 6 and 7 below show both types of activity fuels treatments on dry and moist sites.

Fuel Model 8 – Proposed Treatment

Figure 6 - Example of treated dry-site on district – fuel model 8 after underburning

Figure 7 - Example of treated moist-site on district – fuel model 8 after grapple-piling and burning piles

The above figures show an example of effectively reducing the surface, ladder, and crown fuels in both dry and moist forest types on the Bonners Ferry Ranger District through mechanical treatment followed by underburning (Figure 6) and grapple-piling and pile burning (Figure 7). These two figures can be compared to Figures 2 and 3 in Section 3.3.3 of this EA – the current condition of the same forest types within the project area.

Crown Fire Potential – Probability of Torching and Crowning Index

Table 12 on the following page summarizes the probability of torching and crowning indexes by alternative and forest type within the treatment units. Fuels treatments will remove the majority of the ladder fuels, thus raising the canopy base heights to approximately 40 feet – a level where surface flame lengths would not be able to move into the tree crowns except for under rare scenarios of extremely high winds. In addition, harvest of the overstory trees will effectively space tree crowns, reducing the likelihood of fire spread from one tree to the next as shown in the increased crowning index (wind necessary to sustain crowning) in the proposed action as compared to the current condition (no action).

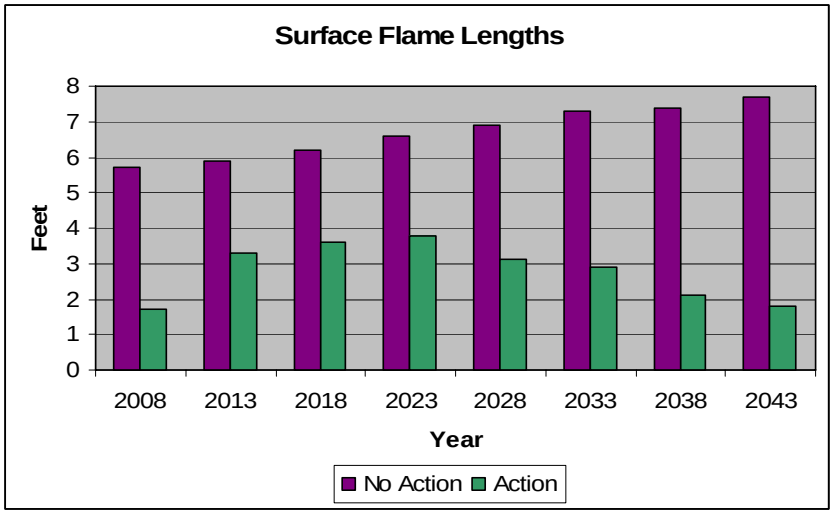
Table 12 - Summary: probability of torching and crowning index by alternative – a range that includes moist and dry forest types.

	Probability of Torching	Crowning Index (mph)
No Action	**90%**	**16-20**
Proposed Action	**0-15%**	**50-100+**

Effectiveness into the future

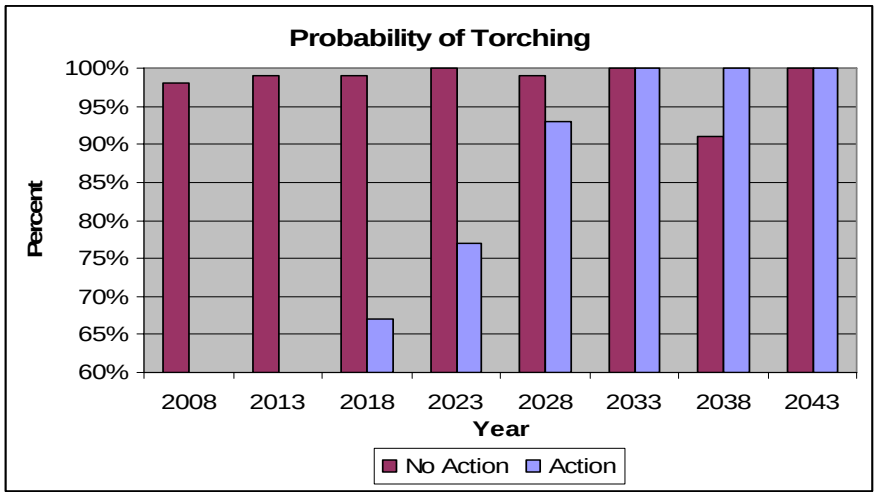
As mentioned, fuels reduction activities are expected to lapse. The following graphs compare the general effectiveness of the action alternative with the no action alternative for the indicators of surface flame lengths, probability of torching, and crowning index into the future.

Figure 8 - Comparison of the general effectiveness by Alternative on the *Surface Flame Lengths* in the treatment areas.



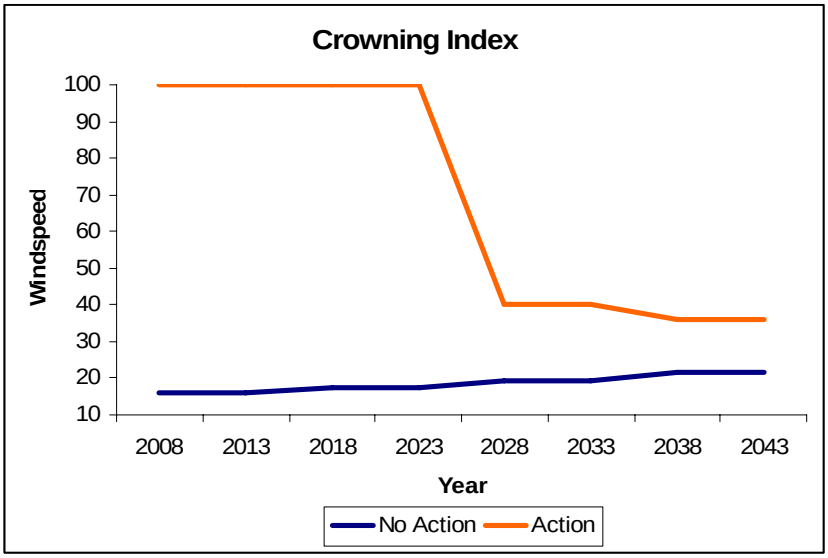
Project related activities would be effective at keeping the expected surface flame lengths under the direct attack threshold for at least 35 years into the future. Without treatment the expected surface flame lengths increases almost linearly from approximately 5.5 feet to 7.5 feet for the next 35 years. This is likely due to the fact that the dead and dying timber currently standing will begin to fall over and increase the amount of woody surface fuels.

Figure 9 - Comparison of the general effectiveness by Alternative on the *Probability of Torching*



The initial entry will have an immediate effect on the probability of torching – reducing it to zero in the treatment year for approximately 10 years. It then increases to approximately 65% - this being a result of regeneration contributing to the ladder fuels under the residual overstory. Within this timeframe an additional entry would be necessary to once again reduce the likelihood of torching the tree crowns.

Figure 10 - Comparison of the general effectiveness of the Alternatives on the *Crowning Index.*



The proposed action would increase the crowning index to a level where crown fire would be nearly impossible. This graph shows a windspeed ceiling of 100 mile/hour – FVS actually predicts the crowning index in the treatment units to be greater than this at initial entry time – meaning a wind event of over 100 miles/hour would be necessary for crown fire to occur in these stands. It would remain at this level for approximately 15 years where it would then decrease to roughly 40 miles/hour – still relatively high. Over the next 35 years the crowning index would still remain approximately 20 miles/hour greater than if the project area were left untreated.

Short term risks of fuels on the ground

Although an immediate decrease in the amount of ladder and aerial fuels will be realized post-harvest, a short-term increase of surface fuels from limbs, tops, and slashed material created from logging activities will increase the surface fire hazard before these fuels can be either grapple-piled or underburned. This short-term increase of fuels will not occur in units where the purchaser is required to or opts to remove these fuels at the same time harvest takes place.

The fire hazard from untreated activity fuels can be mitigated in several ways, one being that fuels reduction projects in the urban interface are considered high priority for the district fire management organization and treatments of these fuels takes precedence over fuels outside of the wildland urban interface. In addition, time of year of harvest can play an important role in minimizing the lag time between harvest and treatment of the activity fuels. Overwintering of slash fuels is often a design feature to leach nutrients back into the soil. Harvest activities that take place in the late fall or early winter decrease the fire hazard because the activity fuels not only have a chance to overwinter, they are on the ground during periods of very low fire danger and can then be either grapple-piled or underburned come the following spring. At any rate, although an increased short-term fire hazard for high intensity surface fire exists following timber harvest, the chance for crown fire is nearly eliminated, as the other ladder and crown fuels have been removed or at least reduced.

C. Air Quality

FOFEM, as described in the methodology in the EA Appendix B Fuels Analysis, was the model used to estimate potential air quality impacts in smoke emissions by forest and activity type. Results are shown in Table 13 below.

The *No Action* alternative proposes no activity to reduce fuels, therefore smoke impacts are not associated with this alternative. The only smoke impacts within the project area under alternative 1 would be those associated with a wildfire burning in the project area – the particulate matter of which is shown below.

The treatment alternative proposes pile burning and prescribed underburning as methods of fuels reduction post harvest. Consumption of fuels due to these activities would release particulate matter into the atmosphere and compromise air quality to some degree. Pile burning generally occurs in the fall, when such activities have less of a negative affect on air quality. Spring prescribed underburning is generally more limiting and many restrictions make for short burning windows.

Table 13 - Total smoke emission (PM 10 and PM 2.5) for project related activities by Alternative

Forest Type & Activity	Emission in Tons/Acre	Total Emissions (Tons)
No Action	0	0
Dry / Underburn	0.97	437
Moist / Pile Burn	1.33	424

Table 14 on the following page summarizes the amount of particulate matter (10 and <2.5µm) released in the treatment area during a wildfire by forest type for the no action alternative and also a wildfire burning in the area after the completion of the proposed action.

Table 14 - Summary of emissions during a wildfire by alternative

Wildfire	Emissions (PM 2.5 and 10) in T/A	Total Emissions (Tons)
No Action		
Dry	0.78	586
Moist	2.03	850
Proposed Action		
Dry*	0.27	203
Moist**	1.02	428

*Includes Biomass thin acres (450 dry-site harvest acres + 300 acres biomass thin). Table 7 above did not include the biomass thin acres because underburning will not take place on these acres.

**Includes plantation acres (320 moist-site harvest acres + 100 acres plantation). Table 7 above did not include the plantation acres because grapple-piling will not take place on these acres.

The above tables show that the amount of emissions released per acre during a wildfire is slightly less than for the underburn – likely for two reasons. Slash fuels would have been added post harvest during an underburn; thus more fuels to smolder longer. The second reason likely being time of year – fuels will smolder longer, prolonging the consumption of the fuels creating a longer period of smoke when the fuels are wet. When they are dry – like during a summer wildfire – they will burn out more quickly creating less overall emissions for that particular area.

Short term risks of fuels on the ground

Although an immediate decrease in the amount of ladder and aerial fuels will be realized post-harvest, a short-term increase of surface fuels from limbs, tops, and slashed material created from logging activities will increase the surface fire hazard before these fuels can be either grapple-piled or underburned. This short-term increase of fuels will not occur in units where the purchaser is required to or opts to remove these fuels at the same time harvest takes place.

The fire hazard from untreated activity fuels can be mitigated in several ways, one being that fuels reduction projects in the urban interface are considered high priority for the district fire management organization and treatments of these fuels takes precedence over fuels outside of the wildland urban interface. In addition, time of year of harvest can play an important role in minimizing the lag time between harvest and treatment of the activity fuels.

Overwintering of slash fuels is often a design feature to leach nutrients back into the soil. Harvest activities that take place in the late fall or early winter decrease the fire hazard because the activity fuels not only have a chance to overwinter, they are on the ground during periods of very low fire danger and can then be either grapple-piled or underburned come the following spring. At any rate, although an increased short-term fire hazard for high intensity surface fire exists following timber harvest, the chance for crown fire is nearly eliminated, as the other ladder and crown fuels have been removed or at least reduced

3.3.7 Past, Present, Reasonably Foreseeable Activities

Timber Harvest and Development

The Camp Nine road is used to access most of the Templeman HFRA project area. Much of this right-of-way and adjacent land is privately owned and development has increased in this area over the past few years.
There are several homes and outbuildings adjacent to the project area and it is reasonable to assume that development will continue. Although there are no structures within the treatment area, the proposed treatment, as designed will facilitate the FireSafe work that has been accomplished around private residences by reducing expected spread rates and intensities of a wildfire, as well as reduce the predicted fire type from a torching or

crowning fire down to a surface fire. The activities proposed for this project will only occur on National Forest System lands – fuels work on private land would need to be accomplished by other means.

Fire Suppression

This project is within the wildland urban interface of Boundary County, thus fire suppression is the appropriate management response for unplanned ignitions. Although fire can be a valuable tool for restoring fire adapted ecosystems and as a means for fuels reduction, wildfire is unwanted where the risk to life and property is a realization. Therefore, the strategy of total control fire suppression will continue in this area into the future.

Agricultural and Private Burning

Open burning season is from October 21st to May 9th annually and many rural residents choose this time to burn ditch lines, brush, timber litter and other woody and herbaceous materials on their land. Air quality will continue to be affected by these burning activities on private and public land into the future.

Fire Occurrence

Approximately 80% of all fire ignitions on National Forest System lands managed by the Bonners Ferry Ranger District are lightning caused. Every summer, thunderstorms bring lightning and fires are generally expected across the district. In addition, this area is used by locals and forest visitors for recreation and other purposes – both lightning and human caused fires will likely occur within and adjacent to the project area into the future.

3.3.8 Cumulative Effects Related to Fire and Fuels

A. No Action

a. Departure from condition class

The No Action alternative will have no benefit on Fire Regime Condition Class in the present because it provides no method for moving the landscape towards a natural range of departure. As each year passes from the current, the departure will become even greater, especially on dry sites that are departed from fire frequency. A wildfire event could affect the fire regime condition class, but it is not possible to assume whether a wildfire in the project area would have a benefit or a negative affect on condition class – it would depend on the range of a fire, as well as the intensity and severity to forest resources. Furthermore, it is not possible to predict when and where a fire will occur on the landscape in the future.

b. Fuel Accumulation & Fire Suppression

As forests cycle through stages of growth, development, and mortality, fuels are continually accumulating in all vegetative layers. Without treatment, this accumulation will only add to the already heavy fuels within the project area, increasing the fire hazard by more than is already present.

Fire suppression will be a continued reality within the project area regardless of the alternative chosen, as it is in a developed part of Boundary County in the heart of the wildland urban interface. The appropriate response to wildfire in this area will be full-control suppression for the foreseeable future. As mentioned, without natural or prescribed fire in which some of these stands depend on a rather frequent basis, fuels will continue to accumulate in all layers adding to the fire hazard.

B. Proposed Action

a. Fuel accumulation – effectiveness of treatment

The effectiveness of the fuels treatments selected was discussed previously and additional fuels treatments in the future will be necessary to keep hazardous fuels at a level where low-intensity fire can be controlled by suppression resources. These activities can include precommercial thinning, continued biomass utilization, piling & burning, and prescribed fire, along with many other activities not proposed for this project but could be considered in the future (mastication, chipping, etc.).

b. Effects of proposed action in relation to previous activities, including FireSafe activities

'Fuel break' treatments to reduce home ignitions have occurred adjacent to the proposed treatment area on some of the private land adjacent to the project area through the Boundary County Fire Safe project. These types of treatments include tree spacing, removing ladder fuels, pruning residual trees, and removing brush and other surface fuels. The proposed treatments for this project are outside of the home ignition areas (generally 100-200' from structure) where FireSafe work is focused, but the project will facilitate work that has been done because the potential for an area to burn takes into account fire moving from one area to another, the rate at which fire moves across a landscape, and the intensity at which a fire burns. Decreasing the likely fire intensity in one area will have a large effect on fire movement and fire intensity in another (Graham et al. 2004). Patches of vegetation that burn relatively slower or less severely than surrounding patches can reduce fire intensity, severity, or spread rate, or may force the fire to move around them by flanking (at a lower intensity), which locally delays the forward progress of a fire (Graham et al. 2004). This would be important where fires have the potential to move from the project area on to private land and into the home ignition zone.

Vegetation modification has occurred throughout the Templeman project area on both National Forest System and private lands, generally through timber harvest activities. Units 1 and 2 have had timber sales conducted in the past that include prescriptions and stand treatments under the Surely Temple Timber Sale (1993-1997) and the Templeman Timber Sale (1982-1986). Units 3, 4, and 4a were treated with the Surely Temple Timber Sale (1993-1997), Templeman Timber Sale (1982-1986), and the Huckleberry CT (1990-1992) – commercial thinning, group selection and some single-tree cutting. The Breakout Timber Sale was conducted on Units 5 and 6, which was sanitation salvage for white pine and did little to modify fuels as only select white pine were removed. Past harvest on the Plantations include the Camp Nine Timber Sale (1981), and for Plantation Unit 29 the Camp Nine Timber Sale (1981), Mini Meadow Timber Sale (1989) and the Little Rock Blow Down (1982). These sales implemented a combination of single-tree and group selection (uneven-aged), regeneration harvesting where the plantations currently exist, commercial thinning, and sanitation treatments followed by fertilizing, yarding topwood, slashing, bucking and grapple-piling and burning slash concentrations. The Templeman Fire burned Unit 7 in 1979, was then salvage-logged in 1980, and planted in 1980-81.

Although most of the activities were not driven by fuels reduction objectives, past harvest activities that reduced canopy, ladder, and surface fuel loadings would have created a discontinuity in fuels thus reducing spread rates and fire intensities. These past treatments have maintained more acres in the early seral stages, providing for the regeneration of more fire adapted species such as western larch – which are more likely to survive even intense fires than climax species such as grand fir (Smith and Fischer 1997). This is true for stands adjacent to the project area and is important for the way fire will move through this area – as fire spread will not be limited to the project area only. As fire moves into stands that have not been treated for ladder and crown fuels the crown fire potential will increase and where crown fire moves into stands that do not have crown structures that can support crown fire, the fire will be forced to drop to the surface fuels. Regeneration harvests that are two or more decades removed from the time of entry have fuel structures that in time will contribute to crown fire potential if left without further management.

Any future salvage activities that take place within the units or along roadsides would, in essence, remove fuels contributing to a fire hazard – salvage activities usually being implemented to remove hazard trees, dead and dying trees, windstorm damage, etc. Salvage activities would only heighten access for suppression resources and reduce the biomass that could potentially end up contributing to the surface fuels as they accumulate once again into the future.

c. Effects of proposed action on the cumulative effects of fire suppression

Of all actions taken, fire suppression is the primary action to be considered when evaluating cumulative impacts to the fire and fuels resource. Much research has been done on the effects of fire exclusion, which has been summarized throughout this report.

Fire exclusion on grand fir dominated sites, together with selective harvesting of seral species such as white pine due to blister rust, has likely had an effect on the number of conifers resistant to root diseases (Smith and Fischer 1997). This is observable in the project area now – having a cumulative effect on fuels and fire behavior in the stands and on landscapes as the dead and dying trees fall and contribute to heavy surface fuels.

Activities under the proposed action would affect the Fire Regime Condition Class by moving the treatment areas towards a condition class 1 instead of towards a condition class 3. This is due to modification of vegetation composition/structure (towards historic reference conditions), modification of fuels to reduce fire severity, and the introduction of fire where fire return intervals are departed from reference values due mostly to successful fire suppression.

3.3.9 Forest Plan and Other Regulatory Direction Consistency by Alternative

Under Alternative 2 (Proposed Action), Forest Plan compliance occurs through efficient fire protection and fire use to help accomplish land management objectives (Forest Plan, Chapter II, pages 10 and 38). Forest Plan Standards for fire management are listed below:

1. Fire protection and use standards are specified by management area. Cost effective fire protection programs will be developed to implement management direction based on on-site characteristics that effect fire occurrence, fire effects, fire management costs and fire caused changes in values.
2. The Fire Management Action Plan will be guided by the following Forest-wide standards:
    a. Management area standards.
    b. Human life and property will be protected
    c. Fire will be used to achieve management goals according to direction in management areas.
    d. Management area standards will be used in Escaped Fire Situation Analysis as a basis for establishing resource priorities and values.
    e. The appropriate suppression response for designated old-growth stands in all management areas, except in wilderness, will result in preventing the loss of old growth.
    f. Activity fuels will be treated to reduce their potential rate of spread and fire intensity so the planned initial attack organization can meet initial attack objectives.
    g. Forest Fuel Management Fund expenditure priorities are:
        i. Natural fuels that pose a threat to human life and property
        ii. Unfounded activity fuel projects
        iii. Areas where fuels/fire behavior is a threat to management area objectives

Following is a description of how each alternative meets Forest Plan standards. Forest Plan standard 2d and 2e relate to wildfire suppression policy and requirements which are not affected by this project, and therefore compliance with these standards is not described. In addition, this project does not determine Forest Fuel Management expenditure priorities, so compliance with standard 2g will not be addressed.

Alternative 1 (No Action)

This alternative would not take any action to protect human life and property within the analysis area from an uncontrolled and unwanted wildfire. The No-Action Alternative would not use prescribed fire to help meet the goals of the management areas within the analysis area. It would not help develop cost-effective fire programs because it is reasonable to expect more intense fire behavior than in treated stands, thus control would be more difficult and likely require a greater number and type of suppression resources.

The continued lack of fuels management would be inconsistent with the Forest plan goals, objectives, and standards because of the continued trend in undesired fire behavior.

Alternative 2 (Proposed Action)

This alternative would be consistent with the Forest Plan as it proposes to use prescribed fire to help meet the goals of the management areas within the analysis area (standard 2a, 2c). This alternative would take action to reduce

potential flame lengths and rates of spread – preventative steps towards the protection of human life and property within and adjacent to the analysis area in the event of a wildfire (standard 2b). The reduction of fuels will also help the initial attack organization meet their suppression objectives, as activity fuels will be treated in order to reduce fire intensities that allow for safe direct attack (standard 2f). This alternative would help develop cost-effective fire programs by reducing potential intensities of wildfires and therefore the costs of controlling potential wildfires.

This alternative proposes to reduce fuels across the most acres in the wildland urban interface; therefore, it better meets the goals, standards and objectives of the Forest Plan, as well as meeting the intent of the Healthy Forests Restoration Act of 2003 and the National Fire Plan – as the proposed action specifically addresses fuels reduction through collaboration in the wildland urban interface of an at-risk community, addresses firefighter and public safety be modifying fuels to reduce fire intensities and the potential for crown fire, and promotes community assistance through utilization of the fuels (biomass) removed as a result of project activities.